# THE TEACHERS' GUIDE

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# THE TEACHERS' GUIDE

## *A Practical Treatise written by Specialists*

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# SCRIPTURE

## CHAPTER I

## Introduction

No present-day teacher of Scripture can ignore the changed attitude towards the Bible which is so marked a feature of the revolution experienced in the realm of Christian thought within the memory of people now living. Fifty years ago, in the vast majority of religious homes, the Bible was not only a book apart from all other books, written, if not by the actual finger of God, at all events at His dictation, but was as it were an ark wherein God Himself was enshrined.

But gradually, yet extraordinarily rapidly—having regard to the proverbial conservatism of religious thought—there has come about an enormous change. Leaving out of account the extreme wings of English Christendom, the old ideas about the Bible have entirely passed away, and, as is not uncommon in a revolution, in some quarters undiscerning reverence has given place either to indifference or to a more or less hostile criticism which threatens to shake to its foundations the conception of the Bible as the final authority in matters of faith.

It is convenient to speak of the Bible, for the term embraces all the books which the Church has accepted as containing the message of God to man. This conception of the Bible as an organic whole has not, however, been an unmixed blessing; since it is partly responsible for the yet too common failure both to trace out the *gradual* growth of human thought about God, and to recognize that, in ages long past as at the present time, those who have laboured to teach religious truth have frequently differed not only in their method of expressing truth but in their opinion as to what is truth.

We must keep clearly in mind the fact that the Bible is not one book, but a whole library of sixty-six books, many of the individual books being composite in character, the whole collection dating from about the eighth century B.C. to the second century A.D., so that there is a period of some nine hundred or a thousand years between the earliest and the latest of the biblical books. Remembering the inevitable changes which the

passage of time introduces, we ought not to expect to find, even in " the unchanging East ", the same mentality, the same social and moral standards, the same degree of spiritual intuition in every part of this great, slowly developed library which we call the Bible. God has been content to reveal Himself slowly, as mankind has been able to bear the different gradual advances of the educative process.

It is possible that in backward circles of thought we may even still encounter a theory of inspiration held by people whom it has become customary to call Fundamentalists. In effect these people say: " The Bible shows no gradual development: every word of it is from God Himself and there can therefore be no talk of lower or higher moral standards, of less or more spirituality. He Who is absolute Perfection from all Eternity cannot drop in any of His utterances below perfection: every word of the Bible must be of equal value with every other word: there can be no contradiction between one passage and another."

Some of our children may have their notions tinged with Fundamentalism: if so, they will need from us a different conception of inspiration. It may be difficult to find a formula of definition; but surely it suffices to accept the New Testament statement: " Holy men of God spake as they were moved by the Holy Ghost," or, as the Revised Version has it: " Men spake from God, being moved by the Holy Ghost." We notice that it was *men* who spake, though indeed their impulse and power to speak were Divinely derived. It was *men*, and not sheets of parchment or papyrus, who were moved by the Holy Ghost. Hence the inspiration which they received was not a mysterious, external force, destroying or superseding their own human powers of thought and feeling, but rather an indwelling influence tending to raise those human powers to a higher pitch. We must reject that view of the Bible which regards it as a Book composed in heaven and dictated, word by word, to men whom God used as His mechanical and involuntary instruments, as a human author may make use of a typewriter. The men who wrote the books of the Bible were seekers after truth, expressing more or less well, each in his own way, those aspects of truth which life's experience had taught them. Their messages were necessarily coloured by their own personality, limited by their own degree of knowledge, shaped by their environment and by the circumstances of their times. To admit this is not to deny the inspiration of the Bible: it is merely to correct dead, mechanical theories of inspiration which are contradicted by the facts, and which sin not only against consistency but against that very reverence for the Bible which the Fundamentalist believes himself to be contending for. Freed from bibliolatrous theories of *verbal* inspiration, we shall dare to study this great literature as we should study other great literatures.

## CHAPTER II

# Methods of Teaching Scripture

To consider now the method of Bible teaching in school: it is first assumed that the subject will find an honourable place in the weekly, if not daily, time-table throughout the pupils' whole course and that in no case will fewer than three lessons a week be devoted to it. However the course of Scripture lessons should be shaped in the middle or later years of school life, there can surely for Christians be no doubt as to how it should begin in the infant school, kindergarten, or other preparatory class, for children of ages, say, 5 to 7, or 6 to 8. The Gospel *only* should be taken for these first two years, and only selections even from that.

It is best at this period to concentrate on the simpler stories from the life of Christ as given by the three Synoptists. The Parables, in general, are to be avoided, except a few, such as those of the Lost Sheep, the Prodigal Son, the Good Samaritan. This opinion may seem wrong in view of the fact that stories are an especially useful and welcome vehicle of instruction to children; but experience shows that young minds are puzzled and repelled by the stories of the man who had not on a wedding garment; of Dives and Lazarus; of the fate of the Five Foolish Virgins; for children cannot, at this early stage of intelligence, take in enough of the necessary preliminary explanation—e.g. with regard to the Oriental use of metaphor and the comparative unimportance of the *details* in an allegory—to enable them to disregard the form and penetrate to the moral lessons of such parables.

To be avoided also are lengthy discourses of Christ, especially the controversial ones of the Fourth Gospel. Children are not profited by a study of the theological controversies of grown-up people, not even by those of Christ versus the Scribes and Pharisees, such as we have in St. John viii. The eschatological discourses on judgment are also unsuitable: they produce a great but often not a wholesome impression in young pupils whose ignorance of apocalyptic forms of expression heightens the terror of the literally received biblical passage. Let the teacher rather choose those passages which set forth most clearly the kindliness and boundless mercy of Jesus to those who were poor or ill or who had done wrong. Such teaching may go straight home.

It is extremely important that we should cause our children to regain the habit of learning by heart—though *never* as a wearisome imposition—large sections of the Bible text. But in the setting of such tasks we should not be guided only by the intrinsic beauty and value of the passages which attract us, but should remember that young children do not appreciate the abstract as readily as the concrete, and that prose with no narrative in it is very difficult for them to learn by heart. Therefore, beautiful as is, for instance, St. John xiv and xvi, it is not the most suitable memorizing

task in the preparatory school. Let us choose instead some narrative passages such as the Call of Sts. Peter and Andrew, James and John; the cure of the paralytic let down through the roof; the blessing of little children; the raising of Jairus's daughter; the marriage feast at Cana—for we need not confine ourselves to the Synoptists in the choice of lessons to be learnt by heart. Of non-narrative passages we may take the Beatitudes, with some other short sections of the Sermon on the Mount.

**First Course.**—It need hardly be said that in this first course of Gospel lessons, regard should be had as far as possible to the chronological order of the incidents studied, so that at the end of the two years' course the children may have a coherently developed, though necessarily incomplete, conception of the salient facts of our Lord's life and ministry. If also—and this is the main point—we have continuously tried to make it clear that the view of God's nature and plan disclosed by Christ is the highest and truest hitherto obtainable by men, and that all other views of God are to be compared with and corrected by Christ's teaching, our children will be ready to turn without moral disturbance to the Old Testament to which it will now be profitable to devote the next two years of Scripture teaching. This does not mean that the New Testament will be completely dropped out of sight: most of the passages to be learnt by heart may still be chosen from the Gospels and explanations should accompany the hearing of them: moreover, one out of three or four weekly Bible lessons may be definitely set apart for New Testament study, say for the easier stories from the Acts of the Apostles (one year), followed by a simple but systematic course on St. Mark's Gospel (second year).

**Second Course.**—But for this age group (7–9 or 8–10) it is suggested that most of the weekly lessons should be on the Old Testament, with the previously given Gospel teaching in frequent mention as a standard of reference and court of appeal. Indeed, if we do not now and subsequently give attention to the Old Testament, but try instead *only* to teach the New throughout a child's school life, we shall find that we cannot adequately teach the New, for the following reasons:

(*a*) With few exceptions the New Testament takes for granted a knowledge of the Old.
(*b*) The New Testament is not Greek but *Hebrew thought*.
(*c*) The work of Christ and the true nature of Christianity is best understood when it is contrasted with that which it supersedes.

Begin the Old Testament course with the Exodus, not making much of the Plagues. Give an account of Moses as the leader of the Hebrews in their journey towards Canaan. Explain that when Canaan was reached the Hebrews came to know the earlier stories of the patriarchs which were being told to gatherings of pilgrims at ancient sanctuaries like Hebron and Bethel. These stories in Genesis may of course be read by and explained to the children, but not pressed upon them as literal historic fact: they should be taught, not as an end in themselves, but rather

as illustrating primitive ideas, in particular, primitive thoughts of holiness and primitive notions concerning suffering. [A fuller treatment of the Genesis stories will be practicable at a later stage.] We shall explain that the stories of the patriarchs mark a growing desire for unity: Jacob represents Central Palestine (Bethel); Isaac, South Palestine (Beersheba); and Abraham, the Judæan region (Hebron). These three are represented as being all of one family. Unifying influences were greatly needed, for the Palestine population was made up of many different tribes and nationalities, all, except those whom Moses had led, clinging to their ancestral religions. When Moses' followers settled in Palestine, they found and adopted sanctuaries and sacrificial rites: these rites were gross and of pagan association, but the Hebrew heroes of the Books of Samuel and 1 Kings show no desire and make no attempt to purify the cult. Accepting and leaving the external religious observances as they find them, Elijah and Elisha fight for recognition of the fact that Jehovah is the only God *for Israel*: the unifying effect of such national recognition was of the utmost importance and its moral influence incalculable, as the Prophets go on to proclaim that Jehovah is a righteous God, demanding right conduct from his worshippers, especially from each to his brother men.

It is difficult and perhaps undesirable, in an article of this kind, to draw up an exact syllabus for a given number of school terms: the pace at which the ground is covered will vary greatly from school to school, and from one teacher to another. How far a two years' Old Testament course will take a junior class, when most of the available Scripture lessons are given to it, cannot certainly be predicted, nor does it greatly matter whether the end of the two years finds the children in Samuel or Kings, for instance. The preceding paragraph has assumed that they may perhaps have reached the story of Elijah and Elisha; but, as it is by no means suggested that Old Testament study will stop at the end of this junior course, the fifth and following years of school life will make up any leeway before further progress is attempted.

**Later Course.**—Probably now there should be a redistribution of the Scripture lessons, so as to give half to each of the Testaments during the rest of school life. In such a case, St. Luke's Gospel may fill a year of New Testament time, St. Matthew's the next year of it, and a closer study of the Acts the next after that (children's ages, 9–12 or 10–13). This will leave the last year or so of primary school life for the study of the Fourth Gospel and perhaps also for one or two of the simpler Epistles, e.g. that to the Galatians. Secondary school pupils will have more time for the Epistles and for other subjects, the greater difficulty of which has necessitated postponement of consideration to this maturer stage. In some schools the Scripture syllabus of the school certificate or other public examination will determine the course during a year or two of the pupil's life in the middle teens. In this connexion the value of including Scripture among the optional subjects offered for examination may be urged, provided that examination exigencies are kept in a strictly sub-

ordinate place and are never suffered to become dominant. Those who desire the exclusion of Scripture believe that this emphasizes the peculiar sanctity of biblical studies, as compared with all the rest. Actual experience, however, shows that subjects not wanted for an examination are apt to receive scantier attention than is their due, and even—under pressure from the parents of candidates—to be temporarily dropped altogether. Besides, it is intrinsically useful at a late stage of school life that close scholarly work should be attempted on a limited syllabus of the Bible text, thus bringing the candidates' knowledge, gathered through years of gradual teaching, to a focus.

The Old Testament lessons will have been continuing throughout the period just considered, becoming gradually less elementary in aim and scope until they too are focused into the books or period set for examination.

The authors of this article believe that perhaps more helps in the way of good modern commentaries are at hand for the teacher in his preparation of New than of Old Testament lessons, and moreover, that it is the Old Testament which supplies the greater number of difficult problems in Scripture teaching at school—problems which, if left without sufficient solution, will vitiate interpretation of the New Testament also. This belief is therefore the reason why most of the remainder of this article will be devoted to a consideration of the Old Testament.

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## CHAPTER III

# Fundamental Considerations underlying Teaching of Old Testament

There are certain guiding principles which should be kept in mind through every stage of Old Testament work.

The first of these is the necessity of facing children's difficulties squarely and dealing with them respectfully. These difficulties, though they sometimes overlap or blend, may be classified under the three heads: (*a*) *scientific*: e.g. the accounts of the Creation; the passage of the Red Sea; (*b*) *historical*: e.g. the building of a city by Cain; the Flood; the age of Isaac; discrepancies in the story of David; (*c*) *moral*.

With a view to their removal the following considerations are offered:

(i) The Hebrews had no knowledge of fixed laws: they knew no difference between the natural and the supernatural. "Even the idea associated with the word 'natural' was yet unborn." A century ago evolutionary science had not come into existence. The Hebrews accordingly classified the most ordinary happenings of life as supernatural: an outbreak of pesti-

lence, a thunderstorm, or an eclipse of the sun was regarded as a miracle, *whenever such an occurrence appeared to serve a particular purpose.* Thus we read in Exodus xiv, 21, " The Lord caused the sea to go back by a strong east wind all the night, and made the sea dry land, and the waters were divided ". The winds that blew back the waters of the Red Sea were like other winds. We know, indeed, from the testimony of travellers—before the configuration of the northern end of that sea was altered by the construction of the Suez Canal—that the phenomenon itself is not without parallel. But its *opportuneness* then, at that critical moment of Israel's history, was felt to be no mere chance. The Israelites, suddenly delivered from peril, recognized the hand of God in the wind and the storm, as centuries later their descendants recognized it in the pestilence which disabled the Assyrian army besieging Jerusalem in the reign of Hezekiah (2 Kings xix, 35–6).

Now the discovery of natural laws has radically changed our conception of nature; but if we believe that it is Divine guidance of our intellectual powers which has made all scientific discovery possible, God is not argued out of His universe, because we are able to follow and understand the methods whereby He realized His purposes for and through the Hebrew people. Nor need our modern thought-forms lead us away from the old Hebrew conception of God in everything, that conception being susceptible of expansion and justification by wider knowledge, so that, as Browning says:

> " God is seen God,
> In the star, in the stone, in the flesh, in the soul and the clod."

(ii)[1] It was inevitable that Hebrew ignorance of fixed laws and consequent neglect of what we call " secondary causes " should bring the Israelites into contact with much in nature and in life that was mysterious and alarming to them. Much that we could explain as the operation of natural laws was to them entirely unaccountable, except on the supposition that all disasters were due to Jehovah's displeasure. Thus, Uzzah's death after touching the ark (2 Samuel vi, 6–7), Saul's failure to obtain an oracle (1 Samuel xiv, 37–44), three successive years of famine in David's reign (2 Samuel xxi, 1–3), with many other such misfortunes, are all ascribed to the wrath of God, only to be appeased by sacrificial offerings. While such biblical stories remain unexplained, it is useless to expect children to accept Ezekiel's declaration that God " hath no pleasure in the death of him that dieth ".

The Hebrews thought that what Jehovah most cared for was " holiness ", i.e. unapproachableness. Any infringement of this would bring disaster. They conceived of the Divine holiness as if it were a *physical* quality which, on coming into contact with human error or sin, would automatically produce an explosion (see Exodus xix, 9–13 and 21–4). The Hebrews do not go into motives: it is only in the later period of the Old

[1] See Preface to *History of the Hebrew People*, by C. F. Kent, Ph.D., Yale University.

Testament that they think of God as taking account of motives, e.g. Jeremiah xx, 12; Psalm vii, 9. In general they regard things from the *external* point of view, concentrating their attention on the act rather than on the intention. Thus, Jonathan's eating of the honey is regarded as sin, though he had been entirely ignorant, at the time, of his father's prohibition of eating (1 Samuel xiv, 24–8). Jehovah is supposed to requite what was actually *done* rather than what was intended, e.g. Isaac's blessing of Jacob.

(iii) Consideration of Hebrew mentality as suggested in sections (i) and (ii) enables us to enunciate a fundamental ethical axiom of the Old Testament. It is there almost everywhere assumed that *all suffering is a judgment on sin.* Impossible as it is to us to harmonise such a theory of Providence with facts observed in the world around us, the Old Testament authors cherish the belief as an article of unimpeachable orthodoxy, the only sustained attempt to traverse the theory being found in the book of Job. The author of this late book describes the disturbance and perplexity into which Job is thrown by his discovery that the orthodox theory must be rejected as untrue to fact; since even a pious man may be visited with heavy afflictions which it would be unjust to consider as punishment for special sinfulness and as a sign of special Divine displeasure. Job's discovery, however, does but scandalize and distress all his religious contemporaries.

Here again Old Testament doctrines are referable to the Gospel court of appeal, and we have only to direct our children's attention to our Lord's teaching as given in St. Luke xiii, 1–5, and in St. John ix, 1–3.

(iv) The discovery of natural law has radically changed our conception of *History* as well as of nature, though we have been slow to give up the pre-scientific conception in the case of *Hebrew* history. Our mode of presenting that history must often have tended to create in children's minds the notion that the Hebrews were a nation living, as it were, alone; so that though, of course, there is mention in the Bible of other nations such as Egyptians, Philistines, Assyrians, &c., yet, as Canon Storr[1] says: "the ordinary operation of historical causes was somehow suspended in the case of this (Hebrew) people. *They* dwelt apart. *They* grew up as a kind of hothouse plant. Special supernatural happenings were common phenomena among them. *Their* history must be written differently from the history of other nations. . . . But in the area of their national life, precisely the same forces were operating that operate in the life of an eastern nation to-day, and we must study that life as a section of human history," admitting that Israel was dealt with and shaped by much the same influences, within and without, as have been employed by Providence in all ages for the accomplishment of high ends.

Moreover, it is not *history* at all, whether according to modern or other standards, which the Old Testament authors were intending to write.

[1] *The Bible and the Modern Mind*, Chapter IV by V. F. Storr, Canon of Westminster.

For history *as* history they had little regard, or they would not have dismissed in a few brief verses their records of people of considerable importance in their day, such as Omri, King of Israel, the first to found a dynasty of any stability in the Northern Kingdom, and the monarch who gave that kingdom its permanent capital, Samaria (1 Kings xvi, 21–8).

The Old Testament authors have one paramount intention—that of securing the moral edification of their readers. Their object is not to teach history, but to give an account of Jehovah's working. Only here and there in the Old Testament do we find any trace of historical or antiquarian interest, e.g. Deuteronomy i. In general, stories of the past are selected and used primarily as parables to inculcate moral lessons. This parabolic employment of a knowledge of past events blinded the Hebrew authors to anything like a modern sense of the importance of strict historic accuracy. Searching for such accuracy, we shall be disappointed: many contradictions will come to light: stories of the patriarchs, as told in one constituent document of the Pentateuch, will not square with the versions found in another document. In 1 Samuel ix–xii Saul is represented as quite a young man: the very next chapters—with no hint that any long interval of time has passed—describe him as the father of a vigorous adult son. Jeremiah and Hosea refer to the Exodus as the happiest period in the relations between Jehovah and Israel: the stories in Exodus and Numbers, however, suggest the reverse. But the discrepancy in this last-mentioned case is explained when we remember that these stories were worked up for a moral purpose, i.e. to prevent mixed populations from reverting to their ancestral gods, at times when the conditions were like those described in 2 Kings xvii.

To explain many stories the Hebrew system of personification must be understood. In Judges i, 2, 3, Judah and " Simeon his brother " are not individuals, but tribes entering into a compact to go as allies to fight the Canaanites. Numbers xx, 18–20, describes a refusal of the Edomite nation to allow the Israelite nation to pass through their territory: the passage reads, however, as if a single churlish individual, Edom, is refusing to let another individual go through his land. Sometimes when two tribes enter into an alliance, the arrangement is described as a marriage of a man and a woman.

It is most important that the historical difficulties in the Old Testament should be frankly recognized, but it should be pointed out that these difficulties did not exist for those to whom the Old Testament was first given. Nor do they exist in an acute form in the minds of quite young children, since, for some years of a child's life *all* stories are equally true, very slight distinction being made between fairy-tale and history. As discrimination gradually develops, the non-historical character of many narratives can be explained, as has been said, by reference to the characteristically Oriental method of teaching by parable. Our Lord's parables are not history.

The Hebrew, although he sometimes made use of what *we* should call

fable (e.g. Jotham's, Judges ix; Joash's, 2 Kings xiv), or parable (e.g. Nathan's, 2 Samuel xii; Isaiah v), usually based his teaching on traditions which were commonly regarded as historical. In doing so, however, his object was not the teaching of history, but the relation of Jehovah's working in past times. When the Hebrew writer seems to be quoting speeches, he is not intending to give the *ipsissima verba* of the person whose story he is relating. All ancient writers composed speeches which they put into the mouths of the heroes of their narratives. Long speeches thus put into anyone's mouth are always a sign that the account in which they appear was written long afterwards, and that the actual author was writing to convey the moral teaching proper to the circumstances of his own day. Joshua xxiv, for instance, breathes the spirit of a much later age than that of the Israelites' invasion of Palestine shortly after the death of Moses: in verses 14 and 23 the exhortation to put away false gods is doubtless an allusion to the idols which we know were worshipped by Israel even in Isaiah's time and later. The author of Joshua would, as a member of the prophetic school, of course oppose idolatrous practices, and he therefore puts his own teaching into Joshua's address. Similarly Elijah's speech, " How long halt ye between two opinions, &c.?" is with a view to the circumstances of an age later than his own. Josephus, the Jewish historian, quite freely *invents* speeches, instead of translating those of the Old Testament into his own Greek writing.

Even if historical accuracy had been—as it was not—a main desideratum, the Hebrew historian would have been sadly handicapped by chronological difficulties arising from his lack of a fixed era by which to date events, though the importance of such an era was not at the time recognized. The Old Testament authors state the length of a patriarch's life or of a king's reign, and occasionally they mention the interval of time between two events; but no " dates " reckoned according to a fixed era are given in any canonical book. Hebrew historical literature gives no chronology till 1 Maccabees i, 10, where we read that Antiochus Epiphanes became king " in the 137th year of the Kingdom of the Greeks ", i.e. in 176–175 B.C. This era of the " Greeks ", or " Seleucid era ", begins with 312 B.C. as its first year.

During the existence of the Israelite and Judahite monarchies it was thought sufficient to date by the years of the reigning king: the Hebrew annalist not only mentions the length of the reigns in the two parallel royal lines, but also gives a synchronistic series of figures by dating the accession of each king by the regnal year of his contemporary in the other kingdom. Comparison of these figures, however, reveals the inaccuracy of some of them, and in any case the method of reckoning is too cumbrous to be of much use. As one instance of discrepant figures we may notice that the regnal years of the Judahite sovereigns, from Athaliah to the sixth year of Hezekiah, amount in sum to 165, while the years assigned to the kings of Israel for the same period, i.e. from Jehu to the ninth year of Hoshea (2 Kings xviii, 10), reach when added a total of 143 years 7 months.

We reach firmer ground only when the history of the Hebrews is in contact with the annals of other nations possessing a more definite chronological system, such as that of the Assyrian monuments. Regulation of the calendar had been facilitated in Assyria and Babylonia by the great advances made in astronomical observation and knowledge by these nations. The Assyrians had certain officers annually appointed whose names were given to the years for which they held office. A list of years thus named, called the Eponym Canon, has come down to us, and a marginal entry noticing an eclipse of the sun (nearly a total one at Nineveh in 763 B.C., vouched for by modern astronomers) enables us to convert the entire list into years B.C. This gives us accurate dates for some events of Hebrew history, as follows:

Ahab was fighting against the Assyrians at the Battle of Karkar (not mentioned in the Bible) in 854 B.C.
Jehu paid tribute to Assyria in 842 or 841 B.C.
Menahem paid tribute to Assyria (2 Kings xv, 19) in 738 B.C.
Rezin, King of Damascus, was besieged by Assyria (2 Kings xvi, 9) in 733.
Samaria was captured by the Assyrians (2 Kings xvii, 6) in 722.
Hezekiah was besieged by Sennacherib of Assyria because he had refused to pay tribute (2 Kings xviii, 14) in 701 B.C.

We must frankly give up any dogmatic system of biblical chronology based on uncertain biblical data, such as the system of Archbishop Ussher, which has found a place in the margin of our reference Bibles.

(v) Perhaps the most important of all principles for the successful explanation of the Old Testament is the necessity of understanding the *idiom* of the Bible. To begin with, all children and even some of their elders need reminding that the Bible was not written in English, and that therefore the vast majority of English-speaking peoples can read it only in translation. Children of an age to begin the study of a foreign language should readily appreciate, from their own grotesque attempts at translation, the difficulty of carrying over the *sense* when changing the *words* of one language into those of another. All teachers, at any rate, will be well aware of this difficulty, which is, of course, much increased when an ancient oriental tongue has to be translated into a modern language of the west. We have to get behind the literal English word into which the Hebrew has been turned, and seek for the *idea* which lies behind the word. The process of translation as applied to the Bible has been far too mechanical to make any version a completely trustworthy guide to the interpretation of Scripture. One danger, in particular, besets the translator from a primitive into a highly developed language; that is, that what is indefinite in the original becomes more sharply defined and limited in meaning in the translation. Thus—to give one illustration—the Hebrew word *'āwôn* may sometimes mean *iniquity*, which is the rendering generally adopted for it in our English versions. But the ideas connected with *'āwôn* are

far wider than the idea suggested by the word *iniquity*, and the use of this English rendering is therefore in many places positively misleading.

Now it is not only in the case of the *Old* Testament that translators have to face the kind of difficulty just suggested: it is true that the New Testament was written in Greek, not Hebrew, and that Greek, being a western language, seems more likely to be understood easily by men of western thought. But the New Testament is Greek only in the sense that the actual words of which it is composed are Greek words: it, like the Old Testament, is a product of Hebraic thought: only its external form has what is western about it. When we seek the *ideas* which the New Testament writers strove to express by Greek words, we must go, not to Greek sources, but to Hebrew, to the Old Testament Scriptures and to early Jewish writings.

To come back to the Old Testament, English students of it need first to be made aware of the extraordinarily metaphorical character of the Hebrew language. A Hebrew, indeed, could hardly speak without using metaphor, and he made no attempt at consistency. We find an example of this in Isaiah xxviii, 18, where the Prophet says to the " scornful men " of Jerusalem, " When the *overflowing scourge* shall pass by, then shall ye be *trodden down* by it ". The water-flood, the whip, and the trampling host seem to English ears impossible for consistent combination; but such a combination would seem quite natural both to the Hebrew speaker and to his audience. To us also it yields perfect sense if we reject the actual *words* and concentrate on the *ideas* intended: we shall then understand that the Prophet is threatening a far-reaching calamity from which his hearers will be powerless to escape.

Since a single Hebrew sentence may contain a jumble of metaphors, Hebrew allegories will naturally employ a similar mixture. In the allegory of Daniel iv, 10–27, for instance, we have a description of a mighty tree of luxuriant growth which is to be cut down, only its stump to be left rooted in the ground. Half-way through verse 15 we see the author abandoning his first figure in the declaration, intended as a menace, that this stump is to be surrounded by the tender grass of the field and wet with the dew of heaven. Of course there would be nothing remarkable or dangerous in its being surrounded by grass and wet by dew: evidently therefore in the writer's thoughts the tree is symbolizing something for which such a position would be *un*natural: the stump, moreover, is to share with the beasts in the herbage of the earth; i.e. it is now presented as a live creature grazing in the fields. Then, in verse 16, this creature is to lose his *human* intelligence and to receive the understanding of a beast (imagine himself an animal). [It may be noted in passing, that the heart, to the Hebrews, was the seat of the intellect, not of the emotions.] The author's thoughts are concentrated, not on the incongruous external form of his allegory, but on what it typifies, i.e. the degradation of a proud and mighty king from his position of world-wide power and importance to a humiliating form of madness, reducing him to the mental status and the physical

conditions of a beast. This allegory is a good illustration of a Hebrew author's indifference to external form, so long as the thought thereby presented was clear. The figures of speech might be incongruous, impossible in fact, or even—to our modern minds—grotesque. None of this mattered; for the Hebrew knew that his readers would interpret each phase of the allegory as it proceeded, and would combine into a coherent whole not the external details but the truths presented by means of them.

If Hebrew mentality were better understood, we should not have ignorant modern readers of the Bible dismissing with a sneer—as some of them now do—so magnificent a story as the Book of Jonah, the high-water mark of Old Testament teaching, the Book which comes nearest to the spirit of the New Testament. For the Book implies universalism, instead of the exclusive nationalism of Israel. Jehovah, Israel's God, is seen as the God of the heathen too; yearning to save Assyria, the most cruel and greedy of Israel's foes; calling a great pagan city to repentance and accepting the signs of penitence. Meanwhile the Israelite prophet is represented as shrinking from the missionary enterprise, and as being afterwards bitterly annoyed because Jehovah, in His mercy, had spared the heathen. The heathen sailors are shown as being in some ways morally superior to the Israelite prophet. He, having turned his back upon his plain duty, has brought them all into the peril of their lives; yet they are most unwilling to save their lives at the expense of his: they do their utmost to save him, too. This conception almost rises to the level of the teaching in the Gospel parable of the Good Samaritan. Jehovah appears as the God of all flesh, caring for the cattle as well as for the innocent little children. There is no wonder that Christ used the Book on a memorable occasion in His teaching. It is deplorable, therefore, that many people only know the Book because of *one* incident in it, the mention of Jonah's being swallowed by a great fish. The unthinking sceptic fails to understand that this incident is only an expansion of the metaphor used in Jeremiah li, 34, 44, to describe the " swallowing up " of Judah by a devouring Babylon and the subsequent release of the captive nation. So the unsympathetic reader laughs at the Jonah story, while on the other hand religious people, zealous for the literal inerrancy of the story, and ignorant or unmindful of the clue provided by Jeremiah's allegorical expression, waste their time in attempts to prove that *one* particular kind of whale (Cachalot) *can* swallow a man; that very occasionally this particular kind of whale *has* been known to get into the Mediterranean; that rare instances have been known of a *shark* (sic) swallowing a man and throwing him up alive immediately afterwards!

Let teachers taking this Book with their classes say to their pupils, " Never mind the whale incident: take it for what it is, namely, a repetition of Jeremiah's metaphor; and get on towards an understanding of the moral and spiritual meaning underlying the whole story."

It is of the highest importance to remember that in our Lord's parables, too, we should make for the spiritual truth which they teach, giving quite

subordinate attention to the external form, and guarding ourselves against the common practice of applying the details to a use for which they were never intended.

The difficulty which English readers find in understanding the metaphorical or allegorical utterances of a Hebrew is intensified by the fact that a Hebrew takes no pains to point out when he intends to be taken literally and when metaphorically. A Hebrew uses but few qualifying particles, and seldom modifies his absolute assertions by any saving clause. He says " blood " when he means " red like blood ", " water " when he means " weak as water ". Thus the prophet Joel declares that the moon will be turned into blood, when he is merely describing the coppery red colour which the moon usually assumes when she is eclipsed by the earth's shadow (Joel ii, 31); and it is stated in Joshua vii, 5, " that the heart of the people melted and became water ".

The free use of metaphor is partly due to a lack of adjectives in Hebrew, a deficiency which is sometimes made good by the employment of the genitive relation. Thus " image of gold " means " golden image "; " tree of fruit " means " fruit-tree "; " the plant of his delight " is " his pleasant plant " (in Isaiah v, 7). The word " son " followed by a genitive supplies another substitute for an adjectival expression; and this needs to be carefully noted, because such a phrase has sometimes been understood too literally by English readers, who have supposed it to suggest an allegorical or spiritual meaning, whereas in reality it denotes some quite common and simple idea. " A year old " is expressed in Hebrew by " son of a year "; " son of a night " means " grown in a night "; " son of Belial " (worthlessness) means " worthless "; " son of death ", " worthy of death "; " son of beating ", " deserving to be beaten ". Thus " son of peace " naturally means " worthy of peace "; so that our Lord's words in St. Luke x, 6, rendered in the Authorized Version, " If the son of peace be there, your peace shall rest upon it ", i.e. upon the house (which seems to make the presence of *Christ* in the house the condition of the efficacy of the Apostolic Salutation), should rather be rendered as follows: " And if one who is worthy of peace be there, the peace which you wish him in your salutation will rest upon him ". In like manner " son of perdition " is not an allegorical name such as Bunyan gives to his characters in the " Pilgrim's Progress ", but a common Semitic way of describing a lost or abandoned man. There is yet another common usage of the word " son " which has sometimes perplexed English readers. The members of a class, or nation, or corporation, or guild are denoted in Hebrew as " sons " of so-and-so. Thus we find mention in Ezra ii, 42, of " the sons [A. V. children] of the porters ", meaning simply the class or guild of porters. " The sons of the prophets " are not young men whose *fathers* were prophets, but are themselves prophets—members of the associations or guilds of prophets. So the " sons of Israel " are not descendants of an individual Israel, but simply Israelites; the " sons of Ammon " are Ammonites, and so forth. Similarly, since the Hebrew word *ĕlōhîm*, generally

translated *God*, may be either singular or plural, the phrase " sons of the ĕlōhîm ", which occurs in Genesis vi, 2, 4, and in Job i, 6; ii, 1, does not mean " the sons of God ", but—as the latter passages show—" the gods ", the class, that is, of superhuman beings. [If " sons of God " had been meant, the sentence would have run thus: " When the sons of God came to present themselves before *Him* ".]

It may here be pointed out that Hebrew contains no equivalent to our word " typifies " or " represents ". A Hebrew, therefore, cannot say, " This typifies such and such a thing ". He is obliged to say, " This *is* such and such a thing ". Thus we find, " The vineyard of the Lord of hosts *is* the house of Israel " (Isaiah v, 7): of the woman sitting in the midst of the ephah it is said " This *is* wickedness " (Zechariah v, 8): and St. Paul says " This Hagar *is* Mount Sinai in Arabia ". In each of these cases we might better give the sense by substituting the word " typifies " for is.

The need has been urged above for a thorough and sympathetic treatment of children's difficulties, the most serious of which are the moral stumbling-blocks which they find in the Old Testament. How are children to be taught such stories as suggest ideas of justice or of morality inconsistent with those enforced by the New Testament? In teaching the Old Testament frequent reference to the Gospel has already been advised. Some difficulties may simply need for their clearance a reminder that the person who is speaking or acting in the story over which the child is stumbling was living centuries before Christ's coming, and that in this primitive character we do not therefore expect to find ideals as high as the Christian standard. We may, for instance, show that our condemnation rather than our admiration should be given to the story of Elijah's calling down fire from heaven to consume his adversaries (2 Kings i, 9–15), since Jesus deliberately pronounced disapproval of such action (St. Luke ix, 51–6; Authorized Version). We can make allowances for Elijah's vindictiveness, the deceit of the patriarchs, Abraham and Jacob, the treachery of Jael, the savagery of David towards the Edomites. But while laying due stress on the incompleteness of the revelation to man on moral matters in pre-Christian ages, we must also admit that recognition of this fact only touches one half of certain of the difficulties just instanced. It *does* supply a reason why " good " men should have committed, without meaning to do wrong, acts which to us are highly reprehensible. It does not, however, explain the fact that in numerous cases, when an Old Testament character behaves in an immoral way, Jehovah is represented as being on the side of the immoral person. Action inconsistent with our ideas of justice, or approval of what appears to us to be unjust, is ascribed to God. Many a statement which to us seems utterly cruel begins with the tremendous declaration, " Thus saith the Lord ". Children are so particularly sensitive to injustice that this point needs to be most carefully dealt with, and the phrase just quoted will be considered below.

The following are some examples of acts or commands of injustice ascribed to God:

1. The supersession of Esau by Jacob.
2. Aaron made High Priest after making the golden calf.
3. The fate of the man gathering sticks on the sabbath (Numbers xv, 32).
4. Israel's exclusion from the Promised Land (Numbers xiv).
5. Massacre of Canaanites (Joshua viii, 25–8) and Amalekites (1 Samuel xv).
6. Praise given to Jael for her murder of Sisera (Judges v, 24–7).
7. Approval of Samson's violence and treachery (Judges xiv, 19; xv, 14; &c.).
8. The supersession of Saul by David.
9. Uzzah's sudden death (2 Samuel vi, 6–8).
10. David's pacification of the Gibeonites (2 Samuel xxi).
11. David and the numbering of the people (2 Samuel xxiv).
12. Praise given to Jehu for a series of ruthless murders (2 Kings x, 30).

As has already been stated above, in sections (ii) and (iii), all disaster was thought to be due to Jehovah's displeasure, and all success and prosperity to His favour. Hence men argued back from the event to its supposed cause. This explains 4, 8, 9, 10, 11, and, to a great extent, 1. With regard to 1, note that Edom (the supposed descendants of Esau) had been settled before Israel, the descendants of Jacob. The question was *why* Edom the elder should have given way to Jacob the younger. In this connexion note also that Malachi i, 2–5, is not vouching for the moral superiority of the *man* Jacob over the *man* Esau, but is arguing that Israel's freedom from such an irretrievable disaster as has overwhelmed the Edomites is a proof that Jehovah is favourable to " Jacob ", but is displeased with " Esau ".

The nation, clan, or family, rather than the individual, was the unit. *Tribal* conditions are frequently incompatible with individualism: it is all-important to keep up the strength of the tribe, if necessary by the extermination of a hostile tribe. Jehovah was *Israel's* national God and concerned therefore to secure the welfare of His own people, with the continued existence of whom His own sovereignty was bound up: hence a rival people, such as Amalek, must be completely extirpated. As the family, and not the individual, was regarded as the unit, Achan's sons and daughters must be executed with him (Joshua vii, 24, 25). Again in 2 Samuel xxi, the famine is said by Jehovah's oracle to be due to Saul and his house because he, Saul, slew the Gibeonites. Saul, being dead before this time of famine, cannot be called to account; so, in order to expiate the wrong, seven absolutely innocent descendants of Saul are chosen, at the arbitrary will of David, and are put to death. The action would be justified by the belief in the solidarity of a family and the

responsibility of the whole family for the deeds committed by one of its individual members. That the writer of this passage believed David's action to be in harmony with Jehovah's will is evident from the words with which he concludes the story: " And after that God was intreated for the land ".

Stories of the past were told as parables, i.e. as a means of impressing laws upon people's minds. Thus, the story of the man gathering sticks on the sabbath is to impress the Fourth Commandment (compare Nehemiah xiii, 15–22): the story of Joshua's massacre of the Canaanites is to impress the law in Deuteronomy xiii, 12–8.

The story of Samson is a popular tale, current in circles with low conceptions of morality.

The foregoing considerations will all contribute, it is hoped, to the understanding of moral difficulties; but the real heart of the matter resides in the meaning of the phrase, " Thus saith the Lord ". There is a peculiar Hebrew use of the word " say ", which often refers to inward saying (to oneself), so that it corresponds in English to the word " think ". In one place, indeed, it is actually so translated (2 Kings v, 11), Naaman's words, " Behold, I *thought* he will surely come out to me " being literally in the original, " Behold, I *said*, &c.". Now there is no oratio obliqua construction in Hebrew, so that the oratio recta must be used. A Hebrew cannot say, " I *thought* I *would* do such and such a thing ": he is obliged to say, " I *said* ' I *will* do such and such a thing ' ". This necessitates in the English translation the frequent insertion of the present participle " saying " as introductory to what appears to be the quotation of the ipsissima verba of a speaker. Sometimes, because of this, one gets a quotation within a quotation, as in 1 Kings xii, 10, the effect of which is confusing to child readers. When we realize that the statement is only by grammatical exigencies forced into this form, we are no longer compelled to accept what follows the word " saying " as the ipsissima verba of the speaker, but only as the summary of what he is thinking or intending (see Exodus iii, 3; Numbers xvi, 34). We may note that in 1 Kings xxi, 19–24, the writer does not attempt to discriminate between the words of Elijah and those of Jehovah. He is only trying to give the gist of what was said and thought. Similarly, the words put into the mouth of Balaam's ass represent Balaam's afterthought about the cause of the animal's shying.

In the Acts of the Apostles the speeches are given in oratio recta, although it is evident that we have only the gist of what was said.

So then, a Hebrew prophet using the phrase " Thus saith the Lord " would not be claiming that God had objectively revealed Himself to him by a miraculous voice, any more than a modern preacher, beginning his sermon with the words, " In the Name of the Father, &c." would be claiming to have received an objective revelation. The Hebrew prophet's introductory phrase would be more correctly rendered, " Thus thinks the Lord ", or in plain English, " This is the Lord's will "; i.e. the prophet is giving a subjective idea of what is right, in accordance with that

conception of justice which prevailed at the time. Samuel no doubt was stating what he himself sincerely believed to be the truth, when he told Saul that it was Jehovah's will that Amalek should be utterly destroyed: but *we* are not compelled to believe—indeed, our Christian faith obliges us to disbelieve—that the ruthless massacre of " man and woman, infant, and suckling " (as retribution for a hostile act committed at least four generations earlier) was actually the will of Him Whom Christ revealed as the Father of all flesh.

Is it entirely superfluous to say that, in teaching the gradual development of religious ideas, the teacher should make the children realize that the development has taken place not in God's essential character and being, but in man's understanding of it? When this truth has been supposed by the teacher " to go without saying ", it may sometimes be missed, as it was missed by a little girl known to the author of this article: the child's answer to one question of an Old Testament examination paper contained the startling statement, offered, however, in all good faith, that " God began by being rather fierce, but He improved as time went on; until at last Jesus made Him almost as gentle as Himself ".

(vi) Of importance akin to that of understanding the verbal idiom of the Hebrews is an understanding of the dramatic factor in their mentality. A Hebrew preacher often *acted* his teaching, and such recorded actions strike children as being intended to have something magical about them, or as being, at any rate, highly bizarre. No modern teacher of the West would tear his new garment into twelve pieces and give away ten, in order to forecast and to illustrate a political change, as Ahijah the Shilonite is recorded to have done in his interview with Jeroboam (1 Kings xi, 29-31). A young man of our own times would not be invited to come forward for ordination as a minister of religion by the dumb charade of being thrust into a clerical coat just doffed by a clergyman; yet a device of this sort is recorded to have been employed by Elijah in calling Elisha to the prophetic office. A " mantle of hair " was a prophet's distinctive dress: Elijah's gesture is therefore equivalent to the verbal announcement to Elisha, " You are to wear the prophet's uniform, as I do " (1 Kings xix, 19-21). The wordless act seems to have been instantly understood by Elisha. Many similar dramatic acts are recorded of the later prophets, accompanying if not taking the place of verbal exhortations. See, for instance, Jeremiah xiii, 1-11; xix, 1-11; Ezekiel xii, 1-12, &c.

If points such as these are left unexplained to junior classes, children will be strengthened in the conviction that Bible times were essentially different from our own, and that the men and women in the Bible were not actual flesh and blood beings like ourselves. From this way of regarding the Old Testament it is only a step to the dispiriting feeling that, after all, as things *were* so different, the biblical records of God's dealings with those men of old time cannot be of much real help to us.

We must not, of course, *begin* with criticism. It has been said, " A wise teacher will learn criticism and forget it ", i.e. make it subservient

to his teaching of the truth. As clear and scholarly a knowledge as possible of Hebrew thought and its expression will be our own necessary equipment; and it is hoped that the considerations urged above may at least point the way to a more thorough and profitable study of the Old Testament than has been within the reach of all teachers under older methods of Bible reading. When we ourselves have arrived at a clear conception of the meaning of an Old Testament passage, we had better tell the story to our class *in our own words* first, choosing our wording very carefully, so as to give a straightforward account, without side glances at possible different renderings. We shall be doing the very thing we wish to avoid if we *begin*: " The Hebrews were not like ourselves: *we* do or say so and so, but *they* &c." This comparison of mentalities will be appropriate in our senior classes. After we have told the story as attractively and constructively as possible, we should ourselves read the biblical passage to the class. Children's own reading tends to be halting, expressionless, and destructive of interest. Probably in the early years no contrast will be perceived between our telling of the story and the biblical text; but if an objector should point out what he thinks a discrepancy—" But the Bible says that God *told* him to " ; or " But *you* said so and so "—then we must explain as simply as may be our reason for so paraphrasing the verbal idiom of the Bible and its expression of an aspect of Hebrew mentality different from our own. If acquaintance with the biblical text grows up side by side with reverent and rational teaching, inspired by Christian standards concerning it, probably very few difficulties will ever come to the children's consciousness. At any rate, we need not anticipate difficulties or combat phantoms as yet unmaterialized.

Since modern views of the Bible have won acceptance and teaching in supposed conformity with them has begun to appear in schools, it must be admitted that much of this new critical teaching has been unsatisfactory because (*a*) it has commonly contented itself with mere analysis, and (*b*), it has made little attempt to get at the thought of the writers of the Old Testament, or to trace out what may be called the Church History of Israel. One hopeful sign, however, of the newer teaching is the prominence given to the Prophets, to whose work the next section of this article will be devoted.

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## CHAPTER IV

# The Prophets

Hebrew prophecy at its highest represents a religious movement of world-wide importance, to which there is no parallel elsewhere in ancient history. The first preachers of Christianity stood in the true line of the Prophets. Even our Lord Himself was felt by His intimate followers to

be best described as " a Prophet, mighty in deed and word before God and all the people " (St. Luke xxiv, 19). Hence the spirit of Hebrew prophecy at its best proved worthy to be absorbed into and assimilated by Christianity; but, lest we should be disposed to regard this absorption as a matter of course, we should remind ourselves that the other great side of Hebrew religious life—the Law, with its ritual of sacrifice and other external observances—could not be so absorbed and assimilated, and the attempt to carry over the legal and ritual system of Judaism into the new faith received its death blow at the destruction of the Temple in A.D. 70.

Yet what has sometimes been regarded as an earlier phase of the prophetic movement gave little promise of the greatness and permanence of influence of the work of the canonical Prophets. So essentially different, indeed, was the teaching of these latter from the movement represented by the earlier classes of leaders such as seers, diviners, and *ecstatic* prophets, that no real process of evolution can be traced. In the Old Testament the name " prophet " is applied alike to such men as Samuel, Nathan, Elijah, and Elisha, on the one hand, and to the canonical Prophets, Amos, Hosea, Isaiah, Micah, Jeremiah, &c., on the other; and this fact is probably the cause of the general but erroneous tendency to consider them all as being merely earlier or later examples of one and the same class.

Insufficient attention has been directed, in the Scripture teaching of the past, to the extremely heterogeneous character of the population living in the land of Canaan in the time of the Monarchy. The subjects of the Kings of Israel and Judah have been regarded as a homogeneous Hebrew people, *all* of whose ancestors were once enslaved in Egypt and brought thence under the leadership of Moses, whose teaching they are thought to have imbibed. It is unlikely that *all* the Israelites went down into Egypt, though it is certain that some did. These latter seem to have remained near the borders of that country, where, after the expulsion from Egypt of the Hyksos Kings, forced labour was exacted from them. Ultimately, about twelve centuries before Christ, the Exodus took place under the leadership of Moses. It will avoid confusion if the name " Hebrews " is reserved for the descendants of those whom Moses had brought out of Egypt.

Egypt, during some years of the fourteenth century B.C., was ruled by the " heretic " king, Akhnaton, whose religious teaching—though not now determinable with historic certainty—is said to have included the following characteristics: (1) One God. (2) The Father of all nations and all creation and consequently (3) the brotherhood of man. (4) God is the God of Truth. (5) No images must be used in the worship of God. (6) Monogamy to be the law, and woman to be the equal of man. (7) No sacrifices, human or animal.

According to a late tradition, Moses, rather more than a century later than Akhnaton, was educated at the Egyptian court and " instructed in

all the wisdom of the Egyptians " (Acts vii, 22). There had been a strong reaction in Egypt against Akhnaton's religious system; but the teaching of Moses was to show such affinity with the beliefs of Akhnaton that it is permissible to imagine a connexion between the two. In any case, it is unlikely that the teaching of Moses was entirely new: some of its features were probably derived from his ancestors, and if, as seems likely, Akhnaton's system may have been the development of a faith held by some of the Semitic invaders of Egypt, there may have been a common origin whence Akhnaton's religion and Moses's creed had both been derived.

From Egyptian history we know that, while the Hebrews were still in bondage in Egypt, Merneptah (King of Egypt, 1225–15 B.C.) in the fifth year of his reign invaded Palestine and conquered some Israelites living east of the Jordan and south of the Jabbok. These conquered people may have been akin to the Hebrews in Egypt. After Merneptah's time the Israelites whom he had conquered were seized by " Sihon, King of the Amorites ", and the Hebrews who came from Egypt, after conquering Sihon, settled among the Israelites and coalesced with them.

It is a mistake to suppose that the Hebrews, on reaching the land of Canaan and after amalgamation with Sihon's late subjects, the Israelites, were able to expel *all* the Canaanites and then to settle, as a nearly homogeneous community, in a land swept clean by their conquests. Judges i distinctly states that many Canaanites remained, the districts from which they had *not* been expelled being the most populous parts of the country. The majority of King David's subjects were aboriginal Canaanites and only the minority had ancestors who had been in Egyptian bondage. The Canaanites submitted to their conquerors to the extent of acknowledging Jehovah to be the Lord of the land, but otherwise their religious rites knew no change. In the tenth and ninth centuries B.C., we should have found three classes of people in Palestine:

(i) Those who were of Canaanite descent and whose religion was the full Canaanitish cult, with the sole exception that Jehovah's name was substituted for that of their ancestral god or gods.

(ii) (*a*) Those who were Canaanitish by race, but who had been largely influenced by Jehovistic teaching.

(*b*) Those who had Israelitish or Hebrew ancestry, but who had come under the debasing influence of the Canaanitish cults.

(iii) A very small minority, clinging to the tradition of a purer religion without sacrifice taught by Moses and practised by their Hebrew ancestors in the wilderness.

Samuel, Elijah, and Elisha would be included in group (ii). The Rechabites (Jeremiah xxxv) would belong to (iii). These people had nothing to do with agriculture, and so could remain entirely aloof from the sacrifices which were connected with the agricultural festivals.

The Canaanite cult was a horrible form of nature worship, the object

of which was to secure the favour of the local Baalim who were thought to have the power of bestowing fertility upon flock and field. Sacrifices (animal and sometimes human) were indispensable to the cult.

The seers, diviners, &c., met a need felt by the early inhabitants of the land of Canaan, in common with other primitive peoples, who, owing to their ignorance of natural law and of scientific causation, were frequently brought by the experiences of life into a state of perplexity and uncertainty. Anyone, therefore, who seemed to be more knowing than his fellows—more able, by possession of clairvoyant powers, to predict the action of supposedly supernatural influences and thus possibly to avert calamity—was sure of a respectful hearing. We find then in Israel classes of seers, diviners, soothsayers, ecstatic prophets, who preceded the canonical Prophets but who must *not* be regarded as the spiritual ancestors of these latter.

The " seer " was a clairvoyant who used none of the paraphernalia of divination.

The diviners employed various methods of consulting the oracle (" inquiring of Jehovah ") and obtaining a response to such questions as could be framed so as to admit of a " yes or no " answer. There was little difference in the early days of the monarchy between the practices of pagan and those who were regarded as Israelite diviners. They cast lots (Joshua vii); they noticed the sound of the wind in the tree-tops (2 Samuel v, 23, 24); they " shook the arrows to and fro, consulted the teraphim (images) and looked in the liver of slain animals " (Ezekiel xxi, 21; Hosea iii, 4). The *priestly* lot, though it may have differed in particulars, was essentially the same thing as divining. Omission of the precaution of obtaining an oracle was believed to invite disaster (Joshua ix, 14 f.), and inability to obtain an oracle when sought was ascribed to the anger of Jehovah (1 Samuel xiv, 37, 38; xxviii, 3, 5, 6). Israelite seers and diviners must have been asked to pronounce on a great variety of matters—straying animals (1 Samuel ix); sick people (1 Kings xiv, 1–6, 12, 13; 2 Kings i, 1–4; viii, 7–10); bankruptcy problems (2 Kings iv, 1); building operations (2 Kings vi, 1–3); the conduct of war-campaigns (1 Kings xxii, 5–23; 2 Kings iii, 11–9)—and in general they received payment, often in kind, for their services (1 Samuel ix, 7, 8; 1 Kings xiv, 3; 2 Kings v, 5, 15, 16). See also Amaziah's taunting words to Amos (Amos vii, 12), where " to eat bread " means " to make a living ". A clever diviner, especially if he could contrive to give welcome and reassuring answers, could make a good income by his profession (Micah iii, 5–7). Naturally, there were some fraudulent members of the profession, as we learn from the denunciations contained in such passages as Hosea ix, 7, 8; Jeremiah v, 31; xiv, 14. Soothsayers, in particular, are condemned in Isaiah ii, 6, and Micah v, 12.

The *ecstatic* prophets were not identical in person or function with either seers or diviners, but they approached no nearer than did these latter to the methods and ideals of the canonical Prophets. We find the ecstatic prophets more or less attached to some Canaanite " high place ":

we hear, for instance, of " the sons of the prophets which were at Bethel ", or " at Jericho " (2 Kings ii, 3, 5). [The canonical Prophets were not attached in this way to a centre of worship such as a particular high place.] The teaching of the ecstatic prophets could hardly have tended to a great amount of moral edification. Ecstatic utterances, poured forth simultaneously by a band of travelling prophets of this class, could scarcely have conveyed intelligible teaching to any chance audience. (See 1 Samuel x, 5, 6, 10–3. See also 1 Samuel xviii, 10, where Saul is said to have " prophesied " or " *raved* "—Revised Version margin—in the house.) Nor were the emotions, to which they gave expression by throwing themselves into a wild, ecstatic state, always of the highest order (1 Samuel xix, 20–4), or markedly superior in kind to those belonging to pagan prophets (1 Kings xviii, 26–8).

Another characteristic of the activities of these ecstatic prophets does not commend itself to us, that is their interference, by means of political intrigue and encouragement of violence and revolution, with the politics of their age. As examples of this, we have Elijah's massacre (in his eyes it would be a necessary judicial execution) of the prophets of Baal (1 Kings xviii, 40); Nathan's conspiracy with Bathsheba to exclude the lawful heir, Adonijah, from succession to the throne of his father David (1 Kings i); Elisha's incitement of Jehu to rebellion against King Jehoram, and the prophet's apparent approval of the appalling series of brutal and treacherous murders whereby Jehu sought to strengthen himself in his new position (2 Kings ix and x).

### The Canonical Prophets

A very different type of prophet, however, was to appear within a century of Elisha's death, to proclaim a nobler message. The first members of the goodly fellowship are the canonical Prophets, of whom Amos is the earliest, belonging to the pre-Exilic period, *c.* 743–586 B.C. They must not be thought of as having gradually evolved from the classes of seers, diviners, and ecstatic prophets who had preceded them. These canonical Prophets are " forth-tellers ", the rediscoverers and proclaimers of a faith which will have nothing to do with Canaanite ritual, but which takes its stand on the purely moral quality of Divine holiness and boldly declares that religion apart from right conduct is worse than useless. They are not conscious of being innovators, but think of themselves as fulfilling the duty of recalling Israel to an earlier, purer, nearly lost tradition which the Hebrews had had in the wilderness, a tradition unfortunately smothered later under the influence of Canaanitish cults. Smothered, but not killed; for the canonical pre-Exilic prophets appeal confidently and fearlessly to the purer traditions of the wilderness wanderings, as to a teaching which remained still in the depths of the national consciousness, though we have no means of knowing by whom it had been transmitted. The Rechabites, as has been said, had lived in accordance with these purer traditions.

Side by side with their fight for the older, generally forgotten conceptions of God's moral demands on His people, the canonical Prophets wage a keen struggle against the religion of Canaan which had been taken over almost intact by Jehovah's people, in many cases by the mere substitution of the name of Jehovah for that of the indigenous god to whom the " high place " had originally been dedicated. It must be remembered that these high places, mentioned so disapprovingly by the author of the Books of Kings—who was himself living at a time subsequent to their closing under Josiah's reformation—had been for generations " the parish churches of ancient Israel ". Every good-sized centre of population had its high place, consisting in simplest form of an open-air altar of sacrifice, with its accessories of sacred tree-stump (" asherah ", wrongly translated " grove " in the Authorized Version) and stone pillar. The pre-canonical Prophets, such as Samuel, Elijah, and Elisha, had made no attempt to purify the cult. Samuel took part in its peace-offering sacrifices (1 Samuel ix, 12, 13, 22–4): Elijah complained that the children of Israel had thrown down Jehovah's altars (1 Kings xix, 10, 14)—the very action which the canonical Prophets would have recommended! Elijah offered a burnt offering on Mount Carmel, the *external* characteristics of which seem precisely similar to those of the sacrifice offered by his opponents of the Baal persuasion (1 Kings xviii, 23–33). With so narrow a line of demarcation between the externals of the Jehovah cult and the cult of the Phœnician or Canaanite Baalim—at a time, moreover, when Jehovah Himself was known as " Baal " (Lord)—there could not but be confusion in the minds of the ignorant rank and file of the Israelite people. Hosea (*c.* 740–722 B.C.) declares that the name Baal must no more be used for Jehovah (Hosea ii, 16, 17); for there is, indeed, very much in a name and in the power of an unwise one to do harm.

The attack on the sacrificial cult begun, in Israel, by Amos (Amos v, 21–5) was continued in that kingdom by his contemporary, Hosea (Hosea vi, 6), and, in Judah, by their contemporaries, Isaiah (Isaiah i, 11–7) and Micah (Micah vi, 6–8). Such an attack, in this pre-Exilic period, of course meant disharmony between the canonical Prophets and the priesthood. It must be recognized, however, that these prophets' lofty conceptions of religion were far above the people's heads; and it must be admitted that it would have been impossible to preserve a State religion on the prophets' lines, in the cultural conditions which the Palestinians had not yet outgrown. The Law and its ritual undoubtedly served to keep the people together: the Law indeed was a husk, preserving the kernel of Monotheism.

Deuteronomy, with its legislation and doctrine, was a Concordat between prophetic teaching and the legal part of religion. Deuteronomy presents us with a form of commandments which is humanitarian, thus reflecting the prophets' insistence that a man's religion is to be expressed by his honest and merciful treatment of his fellow-man. Note the reason given in Deuteronomy v, 14, 15 for the keeping of the weekly sabbath,

" that thy man-servant and thy maid-servant may rest as well as thou ". This Concordat was done away with when Christ took His stand on the foundations laid by the prophets.

The difference between the canonical Prophets and the ecstatic prophets is important enough to justify a few more words on the subject. In an attempt to discover continuity between the ethical teaching of the ecstatic prophets, such as Elijah and Elisha, and that of the canonical Prophets, Amos, Hosea, Isaiah, &c., Elijah's attitude towards the murder of Naboth is sometimes instanced. Elijah must have had the whole nation behind him, except a few servile members of Ahab and Jezebel's court, when he made his protest. If such a fate could befall an ordinary, innocent, well-to-do subject like Naboth, nobody could feel safe who might have the misfortune to possess something which took the fancy of a member of the Royal Family.

Nor were Elijah and Elisha the true fore-runners of Amos, Hosea, &c., in religious matters. We have already noticed the difference in their respective attitudes towards sacrifice: there were differences too in their theological conceptions. It is true that the earlier pair fought bravely and strenuously for recognition of the fact that Jehovah alone had any claim to be the God of Israel. They have been called " henotheists "—believers in the theory, " one land, one god ": in the case of their own country their slogan was " Jehovah for Jehovah's land ". This is not the true monotheism which was to characterize the teaching of Amos and the other canonical Prophets. Elijah determines, with magnificent courage, to banish the Tyrian Baal from Israel, to send him back, as it were, to his own land, Phœnicia: Elisha is content that Rimmon should continue to be worshipped in Syria and that Naaman—a convert to the Jehovah cult—should, on his return to Damascus, support, at least by his presence and outward conformity, the Rimmon cult (2 Kings v).

The political intrigues of the ecstatic prophets and their use and encouragement of violence were fortunately rejected by the canonical Prophets, who were content to rely upon the truth of their words to gain their acceptance. It is true that these latter Prophets are largely concerned with the politics of their age: the main effort of the pre-Exilic prophets in the political sphere is to keep Israel from engaging in senseless military adventures. Egypt was the evil genius. A settled Palestine was a danger to her, and she constantly used her influence to undermine the willingness of Israel to acquiesce quietly in Assyrian or Babylonian suzerainty, since Palestine under such suzerainty would have been a good jumping-off ground for the invasion of Egypt by the great rival Western-Asiatic power. But these Prophets do not share what seems to us the singular indifference of the ecstatic prophets to the advantage of stability in national government and international relations. Elisha's approval of Jehu's revolution is reversed by the stern denunciation by Hosea of those same deeds of violence.

That the canonical Prophets were *excited* preachers might be inferred

from their nationality, and from such passages as Amos vii, 16; Hosea ix, 9; Micah ii, 6 ff. But there is no evidence that they lived in communities, or that they ever produced an ecstatic state by such methods as Elisha used (2 Kings iii, 13–5); and, moreover, the ordered metrical form of many of their utterances, as well as their subject-matter, does not support the supposition that they were ecstatic.

They certainly depended on the gifts or fees of those to whom they "prophesied" (cf. Amos vii, 12 ff.; Micah iii, 5; ii, 11).

For the mode of living of the canonical Prophets there is not much evidence. Amos (vii, 15) had evidently given up a lucrative business and was therefore dependent on alms. Hosea (iii, 2), though poor, appears to have had some means of livelihood. Isaiah gives us the *impression* of a man fairly well off, and Jeremiah (xxxii, 6 ff.) evidently had some property.

The canonical Prophets, like our Lord, preached wherever they could find an audience, e.g. in a temple (Amos vii, Haggai ii), or in any public place (Jeremiah vii, 2; xix, 2, 14), or in a private house (Ezekiel xiv).

No doubt there were many prophets who, like the canonical Prophets, did not belong to any regular prophetical *guild*, i.e. who were not among the "sons of the prophets". Such teachers would perhaps tend to be discredited (cf. Ezekiel xiii; Jeremiah vi, 13; xiv, 13 ff.; xxii, 9–40; xxvii–ix; Isaiah ix, 15). It is evident that even in the case of prophets who were accounted true, there was sometimes no precise tradition of their teaching; e.g. Uriah, the son of Shemaiah (Jeremiah xxvi, 20).

The pre-Exilic canonical Prophets, from Amos onwards, insist, as has been said, on the purely *moral* quality of Jehovah's holiness, which had previously been regarded as the physical quality, "untouchableness", any infringement of which would bring disaster. To them, therefore, religion does not consist in the rigorous observance of a system of "taboos", or in the propitiation of an easily-offended Deity by means of sacrifice. The phraseology of our Christian hymns and formularies has borrowed so many of the technical terms of Israelitish sacrifice, and the ideas of the latter have become so sublimated in the transference, that we can now scarcely visualize the horrors of the ritual. Distasteful as must be the attempt to visualize them, it must yet be made, if we would understand the prophets' attitude. Who of us could bear to watch the Levitical porters (or should they not rather be called butchers?) in their greasy blood-stained garments, staggering up the altar-slope with the warm, quivering carcasses of newly-slain beasts, amid the thick, foul smoke from the burnt fat and flesh? If we find it hard to believe that the God and Father revealed by Jesus Christ could ordain anything so barbarous, a study of the great Prophets encourages our scepticism in this matter, for Jeremiah insists that the Lord ordained nothing of the sort. He begins a famous utterance by sarcastically suggesting that the people of Judah should increase their participation in sacrificial rites by consuming at the sacrificial meal not only the meat of the peace-

offering, but also that of the burnt-offering, instead of allowing the latter to be consumed in the altar fire (Jeremiah vii 21–3).

But such prophets were announcing unpopular theories, which cut right across not only the religious but the social habits of the people. The sacrificial cult seemed essential to the securing of fertility in agriculture. The peace-offerings provided the chief opportunities for festive gatherings: the temples and high places were thronged with worshippers: famous sanctuaries, such as Bethel, Gilgal, and Hebron, attracted crowds of pilgrims. We can understand why these particular external observances of religion were so popular, if we remember that an Israelite's opportunity of entertaining or of being entertained on any lavish scale could occur only in connexion with the offering of a sacrifice to Jehovah. The people, as a rule, might not kill beef or mutton at their own homes, as a purely secular act, to provide for their domestic needs; but the bullock or sheep must be taken to the nearest convenient sanctuary, there to be slain and dealt with according to a prescribed ritual. The blood must be poured out and the kidney-fat burnt on Jehovah's altar (1 Samuel ii, 15, 16; xiv, 32–5): at certain periods of Israel's history the officiating priest was next entitled to claim as his fee part of the animal's carcass: the rest of it belonged to the man who sacrificed; and, when it had been cooked at the sanctuary by the cook employed there for that purpose, it provided material for a feast, invitations to which had previously been sent out (see 1 Samuel ix, 12, 13, 19, 22–4). It is difficult to say exactly where the religious part of a peace-offering celebration left off and the social part began, the two were so closely blended. A modern author has said, " An Israelite peace-offering was half a pilgrimage and half a picnic."

Scenes of immorality, gluttony, and drunkenness were common at these feasts, so common that we can understand, in the story of Hannah in 1 Samuel i, why the old priest Eli should have been so quick to conclude that Hannah's agitation was due to intoxication. As yet, however, primitive Israelite standards did not condemn the holding of these gross festivals. It was not until three centuries later than Eli's day that Amos expressed abhorrence of the whole sacrificial system and led the attack on it which was carried on by all the great prophets from Amos's time till the Exile. The conservatism of the nation, however, either prevented all reform or limited it in scope. After the invasion of Sennacherib, Isaiah was at the top of his power and, under his influence, Hezekiah began a reforming movement, the extent of which is doubtful. In any case Hezekiah did not live long enough thoroughly to purge the land. When Hezekiah's great-grandson, Josiah, became king, Judah was reduced in size as a result of the late Assyrian conquests in part of her territory, and the closing of the local sanctuaries was therefore now a practical reform. Public opinion may have moved on since Hezekiah's time: also, the religious reaction under Manasseh and Amon, Josiah's immediate predecessors, with the accompanying persecution of the party of reform, may have aroused sympathy with the martyrs, whose " innocent blood " had " filled Jerusalem

from one end to another " (2 Kings xxi, 17). At any rate, Josiah felt himself impelled and able to insist on a far more drastic reformation than that attempted by Hezekiah. All the high places were closed and the law of the one sanctuary (the Jerusalem Temple) enforced. The people in the provincial towns of Judah were helpless in the matter of retaining their local places of worship. The king had Jerusalem at his back, because, with the closing of all other sanctuaries, the Temple would be greatly enhanced in prestige. The Temple was the royal sanctuary and the priests there were the king's servants.

Josiah's reformation was an illogical compromise. The practice of sacrifice, it might have been argued, must be either right or wrong: if right, why make it so difficult? if wrong, why maintain it in Jerusalem? In the account of this reformation, given in 2 Kings xxii and xxiii, we are surprised to find no mention of the name and influence of the great contemporary Prophet, Jeremiah. Had the latter desired the entire abolition of *all* sacrifice, and withdrawn his co-operation when it became evident that the King's reform would be only a compromise, whereby sacrifice would still be permitted in Jerusalem? If, as seems likely, Jeremiah and Josiah could not range themselves in the same religious party, we have a crowning instance of the disharmony between the prophets and the state religion, even when the latter was at its purest.

Josiah's reform was in one sense permanent, for though there was a recrudescence of superstitious practices under his son, Jehoiakim, yet by the middle of the sixth century the law of the one sanctuary seems to be fairly well established. Josiah's premature death in 608 B.C. was a disaster for Judah; for the feebleness and treachery of his successors provoked the supreme tragedy of the Babylonian conquest. In 597 B.C. Jerusalem was besieged by Nebuchadnezzar's troops; but the city was saved from destruction, for the young king, Jehoiachin, mollified Babylonian wrath by his surrender. He suffered, however, deportation into Babylon, together with his court and his most prominent and influential subjects, among whom was the young priest-prophet, Ezekiel (2 Kings xxiv, 14–6). Eleven years later, in 586, came the end of a later siege of Jerusalem in Zedekiah's reign, when the Temple was destroyed and another batch of Jewish captives suffered removal in captivity to Babylon (2 Kings xxv). Henceforth, while the captivity lasted, priests and prophets, reformers and reactionaries were all alike domiciled in an " unclean land ", in which no altar could be reared for the sacrificial worship of Jehovah, and where, consequently, some aspects of the struggle between the prophetic and the priestly ideals seemed temporarily of less urgency. During the captivity, however, the influence of the school of Jeremiah continued in Palestine, while quite independently Ezekiel was at work in Babylon. The Jews of the captivity could not sacrifice, but they could carefully observe the weekly sabbath as well as a system of food taboos, &c.: Ezekiel was probably not unlike a strict modern Jew in a Gentile region.

Ezekiel is a very important figure. He had been brought up in reformed

Judaism and he kept the Jews loyal to that higher ideal. He had served in the Temple priesthood only *after* Josiah's reforms, though in his childhood the furious controversy engendered by those reforms must still have been raging. He shows plainly that he had heard of the former abuses; but they had been banished from the Temple as he remembered it, and it was therefore possible for him to ignore them. Though he was deeply impressed by the moral teaching of the school of Jeremiah, he was himself a priest and an institutionalist. Sacrifice no longer played its former part in the social life of the people, and even those who were most faithful to the anti-sacrificial principles of the great prophets from Amos to Jeremiah came in time to tolerate the Temple ritual. In forgetting the abuses Ezekiel also forgot that these Prophets had fought against the sacrificial system itself. Therefore Ezekiel set himself to preserve carefully all that he could remember of the Temple ritual. He felt sure that the Jews would return to Judah and that the dynasty of David would be restored. To him, indeed, there was only one legitimate dynasty, viz. that of David, and one legitimate priesthood, viz. that of " the sons of Zadok ". He and the other blue-blooded Jews in captivity would not admit that those left behind in Palestine were of any consequence. He talks of " the whole house of Israel " when he means only the Jews in captivity. In his insistence on what he regarded as the Divine right of the dynasty of David he was setting an unfortunate example to Zerubbabel, a member of David's line, who was later on, as Governor of Judæa under the Persian king, Darius, to magnify his office unduly. It was Ezekiel's insistence on the exclusive rights of the Zadokite priests and their ritual which led to " that amazing development of ritual ordinances now known as the Priestly Code ". His influence on subsequent ages has been very great. " He was the father of Judaism, but of a Judaism in which the Gospel could not germinate."

Meanwhile, religion was not dead among the Jews who had remained in Palestine: it seems highly probable that sacrifice continued at Jerusalem all through the period of the Exile; for the destruction of the Temple building would not necessarily have involved destruction of the stone altar in the open air outside: if it had, the altar could have been easily replaced. There would at first be a difficulty due to the absence of the deported Zadokite priests, who for the last thirty-five years, since Josiah's reform, had alone been allowed to perform sacerdotal functions at the Temple. But only ten miles north of Jerusalem was Bethel, with an ancient priesthood which professed to have been founded by Aaron. The sanctuary at Bethel, closed at the downfall of the Northern Kingdom of Israel, had later on been reopened by the express permission of Esarhaddon, King of Assyria (2 Kings xvii). It seems likely that, after the destruction of the Temple in 586, the Aaronite priesthood were persuaded to close Bethel and migrate to Jerusalem, Jerusalem thus becoming the place of sacrifice not only for Judah, but for southern Samaria also. This supposition finds support in a late statement (Ezra iv, 1 ff.), which represents

the Samaritans as desiring to take part in the rebuilding of the Temple after the Return from Captivity: in any case before the time of Nehemiah the Samaritans must have recognized Jerusalem as the one legitimate place of sacrifice, since there could have been no Samaritan schism if there had not previously been union.

That the make-shift arrangements in Jerusalem caused some difficulty later on after the return of the Zadokite priests may be inferred from the allegory in Zechariah iii, where Joshua, the (Aaronite?) chief priest in 520 B.C. is represented as being on his trial, clothed in filthy garments to indicate ceremonial uncleanness. Probably the returned Zadokites were attempting to oust him from his office. But the support of the prophet Zechariah enabled Joshua to win his case, and secured recognition of the Aaronite priests. When news of the settlement became known in Babylon, the exiles there accepted the fait accompli and called Zadok a descendant of Aaron, as a way out of the difficulty.

The Exile had had a great effect. After the return of the exiles there was no organized attempt to restore the things which Josiah had abolished. In many respects the school of Jeremiah came into its own. It was Jeremiah, indeed, who had marked out the way which led to Jesus Christ.

Pagan superstitions were now entirely discredited and a purer monotheism accepted, once for all, by the priestly party as a whole: the Prophets, on their side, had come to tolerate and even to see the value of a ritual system purged of its grossness. Hence the post-Exilic Prophets, Haggai and Zechariah, urge the importance of rebuilding the Temple and restoring its services. Malachi, in the course of the next century, while still insisting on the indispensability of right conduct (Malachi ii, 10–6; iii, 5), yet attaches great importance to the exact maintenance of the Temple ritual to be performed with reverence and decency.

Would the religion of the Prophets alone have carried Judah through the worst religious crisis of her history, when Antiochus Epiphanes (175–164 B.C.) was seeking to effect a final extinction of the Hebrew Faith?

It may here be said that the Scripture course, even of a primary school, should somehow be stretched to include at least a brief account of the Maccabæan period, so important is it for an understanding of what lies immediately at the back of the conditions revealed in the Gospels. The Book of Daniel will naturally be taken in this connexion, but this will be postponed until after as thorough a study as possible has been attempted of the prophetic movement from the eighth to the fifth century B.C.

It may be assumed that most teachers of middle and elder classes are now willing and anxious to bring at least some of the Prophets into the Scripture scheme; for it is now generally recognized that much has been lost in the past by ignoring the Prophets (except as a storehouse of passages containing supposedly Messianic predictions), and by concentrating too exclusively on the "historical books" of the Old Testament. Indeed

the pendulum has swung so far in the direction of the Prophets as to cause neglect of the history, without which the Prophets cannot well be made intelligible. Let a teacher take his class carefully and thoroughly through 2 Kings, and then see how naturally he can introduce Amos immediately after 2 Kings xiv, 23–8, Isaiah vii after 2 Kings xvi, 5, other chapters of Isaiah in connexion with 2 Kings xviii–xx; many chapters of Jeremiah to fill out the story of the closing years of Judah's monarchy as given in the last four chapters of 2 Kings. Similarly let a class break off from Ezra v, 2 to read Haggai and Zechariah i–viii. Taken in their historical setting the Prophets can be made extremely interesting to schoolboys and girls; but to present them as Old Testament saints of no particular period, whose sole reason for preaching was prediction of a Messianic age understood neither by themselves nor by their audiences, is entirely to misuse the opportunity afforded by the study of them.

It is not suggested that the whole of one prophetical Book shall be linked up with what seems the appropriate scrap of history: rather should a considerable period of history be connected with a mere scrap or scraps of the Prophet; for it is futile to attempt always to explain the Prophets in large sections or chapters. Isaiah, for instance, cannot be taken with a class in the order in which the chapters are given in the Bible, as one might take a Shakespeare play straight through from beginning to end, in the author's sequence of Acts and Scenes. The following considerations forbid this continuous treatment of a prophetical book.

The Prophets (the pre-Exilic ones, at any rate) did not write down their words with the object of producing a book to be consecutively read. It is true that those Prophets whose compositions have been preserved in separate books are sometimes spoken of as the *literary prophets*; but there is no proof that they themselves wrote down their prophecies. Indeed it is more probable that, with some exceptions, the words of the canonical Prophets have been preserved in the same way as our Lord's words. Our Lord, as far as we know, neither wrote anything Himself, nor charged His disciples to commit to writing any account of His sayings or of the events of His ministry. Teaching in the Hebrew nation had always been *oral*, the singularly retentive memory of Orientals being strengthened by the method which it made feasible. We get, in Isaiah viii, 16, 17, a hint of an oral stage in the transmission of his message. His prophetic teaching, he declares, is to be made into a sealed parcel, laid up in his disciples, as in a repository, so that it may not be lost. This has been sometimes understood to mean that Isaiah himself determined to prepare a *written* record in the form of a sealed document to be committed to the custody of his disciples. " But though there might have been some point in laying up in a sealed envelope a definite *prediction* until the time when the prophet declared that it would be fulfilled, it is difficult to see what purpose could be served by sealing up exhortations to repentance, teaching as to the will of Jehovah, warnings against superstition and sin. It is more natural to understand that the prophet's teaching must be

written on the fleshy tables of his disciples' hearts, where it might be known and read of all men."[1]

Another indication that Isaiah's prophecies were originally published orally is to be found in the poetical form of some of them. A poem can be easily learnt by heart and repeated, and in this way prophetic teaching could be quickly and conveniently spread.

Jeremiah began to preach in the thirteenth year of King Josiah's reign (i.e. about 626 B.C.), but did not take steps to have his prophecies written till he employed an amanuensis, Baruch, for that task, in the fourth year of King Jehoiakim (i.e. about 604 B.C.).

When truths are to be transmitted *orally*, the success of this oral tradition will depend much upon arrangement. In learning by heart we depend more on prominent *catchwords* than on logical or chronological considerations; and a system of catechetical instruction produces the same result. Different passages, therefore, tended to be placed in juxtaposition in the memory, and subsequently to be written together, sometimes out of their original contexts, because they contained an identical phrase serving as a catchword. Thus, though Isaiah i, 10–7, is not really consecutive after i, 2–9, it is placed immediately after it, because of the supposed connexion afforded by the words " Sodom and Gomorrah " in verses 9 and 10. The phrase " House of Jacob " has served similarly to bind together Isaiah ii, 3, 5, 6. " Vineyard " connects Isaiah v, 1–7, with verse 10. Many similar instances could be given from Isaiah and from other Prophets. So also in the Gospels we find passages linked together, not necessarily because of a chronological connexion, but because they deal with kindred topics. Thus, in St. Mark ix, we have " offend ", " fire ", " salted ", " salt ", and in St. Mark i, 21; ii, 12, we have records of *healings*; St. Mark ii, 13; iii, 6 gives records of *controversies with Pharisees*. St. Matthew xiii gives a number of parables explanatory of " *the Kingdom of Heaven* ". St. Luke xiv relates incidents and teachings relating to *meals*.

It is evident that this method of arrangement makes it easy to add *later insertions*. In Amos i, 11, 12, we have a denunciation of Edom (which, in Amos's day, was too weak to behave in the tyrannous way described), couched in phraseology similar to that of Amos's denunciations of other neighbouring nations. The passage concerning Edom was probably added at a later time, when Edom was in a position to behave spitefully to Judah.

*Later modification* also was facilitated by the method of arrangement described above. Jeremiah used with reference to the Chaldæans his own earlier prophecies about the Scythians. Similarly Isaiah's utterances against Assyria were applied quite naturally to the Babylonians, and then were combined with prophecies which *originally* referred to the Babylonians, Isaiah x, xiii–xiv. [N.B. In this latter passage Babylon has become the symbol of the world power, as in Revelation xvii–xviii.] The process of

[1] *The Composition of the Book of Isaiah*, Professor R. H. Kennett, D.D., The Schweich Lectures, 1909.

modification was applied also to prophecies addressed to the Northern Kingdom of Israel, for these needed alteration or enlargement to suit the case of Judah: Amos ii, 4, 5, is an instance of this.

A study of the Synoptic Gospels shows what changes could be made in the literary period, sometimes through the extension of methods already described, sometimes for other reasons.

A comparison of Chronicles with Samuel and Kings shows how the Chronicler's prepossession leads him quite arbitrarily to correct his sources. We have to remember that—in Mr. Bruce Taylor's words—"*Chronicles*" is not history, as we understand the term, but history rewritten from a late standpoint, with the intention of carrying back into a remote past the origin of customs which the writer considered to be vital for true faith. He is concerned with the history of Judah, and that history interests him only in so far as it has special reference to the worship and institutions of the second Temple. This determines his choice of matter and the treatment of such facts as he selects. . . . There is a large class of additions connected with ritual. . . . He finds it necessary to change several narratives in the interests of the Levites," whose importance he is careful to emphasize. Cf. 2 Samuel vi, 12 ff. with 1 Chronicles xv; 1 Kings ix, 10–3 with 2 Chronicles viii, 1, 2; 2 Kings xi with 2 Chronicles xxii and xxiii.

Into written prophecies of stern denunciation were later inserted passages of comfort. Thus Amos, whose original message to North Israel had been one of almost unrelieved gloom, was, in later days, felt to be too stern and menacing for the edification of the people of Judah who had suffered the humiliation and anguish of the Babylonian conquest. So words of comfort (Amos ix, 11–5) are added to the Book of Amos, and other books receive similar additions. In a later day, when the Canon was definitely closed, and the books of Scripture had come to be regarded as too sacrosanct to admit of any modification, the principle which had guided the earlier editors of the Scriptures regulated the practice of the Synagogue. It there became customary for the reader after reading the last verse of Isaiah, Malachi, and Ecclesiastes to repeat the last verse but one, in order to avoid closing with words of woe.

Bearing in mind the modifications, alterations, and additions for which the editors of the Scriptures have been responsible, we shall see the need of discrimination in selecting passages from the Prophets to teach to our classes. It is not, of course, here suggested that the teacher's *reasons* for his selections should be fully set forth in any but the senior classes, if there, even: it will obviously be wise to choose such prophetical books as have undergone least editing, and perhaps to leave altogether—to be dealt with in a university lecture-room—a subject so difficult as the composition of the Book of Isaiah. There will remain very much of the work of the Prophets which can advantageously be introduced into the school Scripture course.

In concluding this section of our subject a word of reminder to teachers may be permitted: children tend to think of a prophet as merely a *fore-*

*teller* of future events. The prophets themselves, however, do not seem to regard the prediction of the future as the main part of their work: Jeremiah xviii says that fulfilment of prophecy is *conditional* on the people's accepting advice. But when the prophet was no longer a figure in society, but the scribe had stepped into his shoes, the sayings of the prophets appeared more sacrosanct and the people supposed that prophecy *must* come true. Thus the Chronicler (end of the second century B.C.) says that it was *Cyrus* who let the Jewish captives return from Babylon to Judah, because Isaiah xliv and xlv had mentioned Cyrus as the deliverer. The prophets Haggai and Zechariah, however, who lived at the time of the Return, make not the slightest mention of any return under Cyrus, but regard *Darius* as the inaugurator of a new policy towards the Jews. So also, at a later time, when the Jewish people were dissatisfied with the Hasmonæan dynasty, they turned back to promises of the reinstatement of the Davidic dynasty, and assumed that these promises *must* be fulfilled.

CHAPTER V

# The Exile to the Coming of Alexander the Great

It has already been suggested, in the section on the Prophets, that worship including sacrificial rites went on at Jerusalem during the period of the Exile. The following reasons for this belief may be given:

Jeremiah lii appears to be an older and more trustworthy account than 2 Kings xxiv and xxv. According to Jeremiah there were *three* transportations of Jewish captives to Babylon:

(i) *In 597 B.C., at the captivity of Jehoiachin* (cf. Jeremiah lii, 28 and 2 Kings xxiv, 14–6). 2 Kings xxiv, 14, says that the King of Babylon transported " all Jerusalem, all the princes, all the mighty men of valour " (= knightly classes or aristocrats: the words have a social significance), " even 10,000 captives ", as well as all the artificers: only the poorest sort of the people of the land remained. But verse 16 speaks of the " men of might " (= " gentry ") as amounting to 7000. According to Jeremiah, however, there were 3023 Jews carried away in this first transportation. Jeremiah xxix, 1, mentions also the priests and the prophets. It is sometimes suggested that Jeremiah's number 3023 perhaps means not all the individual captives, but only heads of families. This is improbable, but even on this assumption, the total number of persons would be considerably less than 20,000.

(ii) *In 586 B.C., at the captivity of Zedekiah* (cf. Jeremiah lii, 29, and 2 Kings xxv, 8). There were now carried away, according to Jeremiah,

832 persons. But 2 Kings xxv, 11, states that the remaining population of Jerusalem was transported at this time and implies that only the peasantry remained. Verse 18 mentions also among those who were transported, Seraiah, the chief priest, and Zephaniah, the second priest and " *the* three keepers of the threshold ", implying that *all* the keepers of the threshold were carried off. It seems likely that on this occasion the whole of the regular personnel of the Temple was transported, for Jaazaniah, the son of Shaphan, and the seventy elders of Ezekiel viii, 11, do not appear to have been priests.

(iii) *In 581 B.C.* (Jeremiah lii, 30). Jeremiah mentions this third transportation, numbering 745 persons, five years later than the carrying off of Zedekiah. It is difficult to account for this on any other supposition than as a punishment for the murder of Gedaliah, which was part of a widespread Palestinian revolt. This murder was committed in the " seventh month " (approximately October) of an unspecified year (2 Kings xxv, 25). It can hardly have been the same year (586) as that in which the city of Jerusalem was captured in the " fourth month " (July: 2 Kings xxv, 3), and the Temple and all the great houses burnt in the " fifth month " (August: 2 Kings xxv, 8, 9), for Nebuchadnezzar was not close at hand at the time, but was at Riblah in the far north; so that there would inevitably have been some interval of time between the carrying away of the captives and the appointment of Gedaliah as Governor after Judah had been settled down. During the governorship of Gedaliah there returned to Mizpah not only the remnants of the Jewish army which had escaped slaughter or capture, but many Jews who had taken refuge in Moab, Ammon, Edom, and other districts. This return of refugees and the events leading to the plot against Gedaliah must have taken some time.

It is not improbable that, during the brief period of quiet under the governorship of Gedaliah, the hope of autonomy for Judah under a native king found expression in Jeremiah xxiii, 5.

It is likely that Ishmael, the murderer of Gedaliah, relied on Egyptian support, and hence there was a great migration to Egypt after the crime (2 Kings xxv, 26) but probably not to the extent implied in Jeremiah xliii, 5–7.

Jeremiah xli, 5, is important as showing that after the burning of the Temple people were still coming there to sacrifice. It must be remembered that " the house of the Lord " denotes not the *Temple proper*, but the whole site, and that the great stone altar of burnt offering would not have been burnt. In any case it is clear that a number of persons gathered in Jerusalem almost immediately. It is of the utmost importance that we should not make the mistake of supposing that either the province of Samaria after 722 B.C., or Judah and Jerusalem in the days of Nebuchadnezzar, became a *vacuum*. The *best* part of the Jewish population was transported in 597 (the " good figs " of Jeremiah xxiv); but although those who remained behind after 586 or 581 might seem very poor soil

for true religion to flourish in, one great fact must be remembered: *Jeremiah* was not carried to Babylon in 586; and if he was carried off to Egypt in 581, the seeds which he had sown, however poor the soil, germinated and sprang up. He had declared that the policy of Judah must lead to exile and he had been vindicated by the event. This must have enhanced his influence. It is remarkable that in the time of Haggai and Zechariah (520 B.C.) and subsequently there is no hint of the heathenish cults so indignantly denounced by Jeremiah and Ezekiel.

We may picture the condition of things in Judah after the murder of Gedaliah as follows: the population at first would be greatly reduced, but before long would be continually increased by the return of refugees and by the immigration of Edomites and others who found it hard to make a livelihood in their own country. Under such circumstances the accumulation of wealth must have been slow. But the very poverty of the land was a safeguard, in that it rendered rebellion impossible.

What were the religious conditions in Palestine at this period? In this connexion certain questions present themselves:

1. Was Judæa absolutely without sacrifice from the time of Gedaliah to that of Zerubbabel? (It has already been suggested that the answer to this should be in the negative.)

2. What had happened in the province of Samaria to make the Samaritans willing to recognize the Temple at Jerusalem?

[Ezra iv, 1 ff.—the work of the Chronicler—takes for granted the Samaritan recognition of the Temple. Moreover, there could have been no Samaritan schism unless there had first been union of Samaria with Judah.]

There is no evidence of *political* union except the very late statement in 2 Kings xxiii, 15 ff., that Josiah desecrated Bethel which was in Samaritan territory; but since Bethel had been reopened by the express permission of the King of Assyria—probably Esarhaddon; Ezra iv, 2—Josiah's action there seems most unlikely. Jeremiah—although in one remarkable passage he appeals to North Israel—normally addresses himself to Judah and Jerusalem. Sennacherib, King of Assyria, claimed that he had in 701 taken away from Hezekiah's Judah forty-six strong cities which he had annexed to neighbouring states, and there is no evidence that these were restored in the reign of Manasseh or of Josiah. Further, Gedaliah was appointed Governor of *Judah* (Jeremiah xl, 5): Sheshbazzar (Ezra i, 8) is prince of *Judah*: Zerubbabel is Governor of *Judah*; so is Nehemiah, in whose time Samaria is clearly not part of Judah.

We may suppose, therefore, that after the second or perhaps the third transportation under Nebuchadnezzar, Judah was left with a place of sacrifice indeed, but with ruined sanctuary buildings and no priests, and that in Samaria one sanctuary, at least, that of Bethel, had a priesthood (2 Kings xvii, 27, 28 ff.), as had also, perhaps, Shechem and one or two other former centres of worship in North Israel.

It is extremely unlikely that the population of Judah calmly accepted

the lack of a priesthood. It was only forty years or less since Josiah's reform had closed the local sanctuaries, and the country population would have no very strict ideas as to the sole legitimacy of the sons of Zadok now in exile. The situation in Judah was very different from that in Babylonia. In Babylonia Jewish priests were unable to exercise their priestly functions because there was no Temple of Jehovah in which to exercise them. In Jerusalem, on the other hand, there remained an altar which everyone in that neighbourhood regarded as legitimate. Moreover it is evident from Ezekiel xliv, 10–4 (note especially verse 13), that the priests of the high places had not been originally regarded as belonging to a distinct order. It seems probable therefore that the deficiency of priests in Judah was made up for by a compromise between Judah and Samaria. On the assumption that Deuteronomy is a work of the sixth century B.C., according to the belief of the writers of this article, we can trace the purification of the popular Palestinian religion from its grosser elements which had taken place since the fall of Jerusalem. [It has commonly been supposed from an uncritical study of the text that the " book of the law " found in the Temple in Josiah's reign (2 Kings xxii) was Deuteronomy. The author of this particular section of the Book of Kings, as it has come down to us, may have held this view; but a very slight change in phraseology would make the statement concerning the book found in the Temple equally applicable to a roll of *any* prophet. There is no trace of the influence of Deuteronomy in Ezekiel.]

If the above supposition is correct, the union of Samaria and Judah in *religious* matters was gradually bringing about a sense of national unity greater than had been known before, at least for centuries. Apart from the Pentateuch we have little literature emanating from Palestine in the sixth century before the fall of Babylon, except some passages embedded in the Book of Isaiah.

In Isaiah xxi, which may be dated about 539, we have the composition of a Palestinian prophet anxiously watching the march of events in the east. He regards Elam and Media as a barbarous horde which will bring about the fall of Babylon, and he anxiously asks what will be the fate of the Jews. They are already " a threshing and corn of the floor ", and they are destined to suffer further (Isaiah xxii). Isaiah xiv, 4–23 (perhaps a little later), regards the fall of Babylon with exultation. [Cyrus, originally " King of Anshan ", a district of Media, had—by his conquests—already become master of Elam, Media, and Persia when he took Babylon in 538 B.C. Thus was established what history knows as the Persian Empire.]

Was there a Return in the first year of Cyrus (2 Chronicles xxxvi, 22 = Ezra i, 1 ff.)? The answer requires consideration of the date of Chronicles. Chronicles, Ezra, and Nehemiah are a compilation by the same author, called " the Chronicler ". Ezra finds no mention in the list of the worthies of Israel given in the Book of Ecclesiasticus (second century B.C.). This omission is only explicable on the assumption that the Chronicler's account of Ezra's important work was not yet published.

The fact that the genealogy of the high priests in Nehemiah xii, 11, ends at Jaddua, who, according to Josephus, was the contemporary of Alexander the Great, only proves that the source which the Chronicler used for this genealogy did not go farther.

The style of Chronicles is very late. The Book found its way very late into the Canon.

The Chronicler's description of the purification of the Temple in 2 Chronicles xxix, which is not taken from Kings, suggests that he may himself have witnessed a similar purification. This may well have been the purification of the Temple by Judas Maccabæus in December, 165 B.C., after its desecration by Antiochus Epiphanes. The details which the Chronicler gives of building preparations (1 Chronicles xxii, xxix) suggest that he had himself witnessed building or restoration work at the Temple on a large scale.

The cylinder inscription of Cyrus gives no indication of a *general* permission of *all* exiles to return to their homes. The Chronicler's statement is probably founded on Isaiah xliv and xlv, in accordance with a late conception that what a prophet had spoken *must* be literally fulfilled. We find this same conception in Daniel ix (second century B.C.), an idea which seemed to find support in an exaggerated interpretation of Amos iii, 7.

Sheshbazzar (or whatever the correct name should be)—Ezra i, 8—was probably extracted by the Chronicler from some list to which he had access of former governors of Judah. Sheshbazzar is evidently a Babylonian official and the Chronicler himself does not distinctly identify him with Zerubbabel.

[Note that the sacred vessels mentioned in Ezra i, 7, are said to have been *cut up* by Nebuchadnezzar in 2 Kings xxiv, 13: cf. xxv, 13. The Chronicler's account apparently depends on Daniel v, 2, 3, and this in turn seems to have been suggested by the gift of sacred vessels made by Menelaus to Andronicus (2 Maccabees iv, 32).]

It seems probable that Cyrus made no change in the government of Palestine. It is remarkable that neither Haggai nor Zechariah (520–518 B.C.) makes any reference to a return of exiles, sixteen or seventeen years before, and both prophets regard Persia as an oppressing power for whose downfall they long.

It is noteworthy, although the story in which the statement is embedded has no historical value, that in 1 Esdras iv, 13, Zerubbabel is said to have been appointed not by Cyrus but by Darius.

It would seem therefore that, if the gloomy forebodings of the author of Isaiah xxi were not realized, the accession of Cyrus brought no change in the fortunes of Palestine. There is no evidence that Cyrus himself visited Palestine. His son Cambyses conquered Egypt in 525, and the inhabitants of Palestine must have been reminded of the power of the empire under which they lived.

In 521 Darius ascended the throne of Persia. In nearly every province except those of western Asia there were revolts, and it may be that, partly

with the desire of placating the Jews, Darius appointed, as Governor of Judah, Zerubbabel, a grandson of a former king, Jehoiachin. It was important to keep Judah tranquil, since a revolt there might endanger the Persian hold on Egypt. Zerubabbel appears to have arrived at Jerusalem accompanied by a suite of Jews in the summer of 520 B.C.

The prophet Haggai on the first day of the sixth month (approximately September) in that year at once urged the people of Judah and Jerusalem to begin the restoration of the Temple, and on the twenty-first of the next month the work was sufficiently advanced to allow of what we should call the ceremony of laying the foundation stone (Haggai ii, 1–9). On this occasion Haggai plainly anticipated the *break-up of the Persian Empire*; and on the 24th day of the ninth month (approximately December) Haggai anticipated that in Zerubbabel would be seen the reversal of the prophecy of Jeremiah on his grandfather Jehoiachin (= Jeconiah, or Coniah), Jeremiah xxii, 24–6.

In the eighth month (November) of the year 520, i.e. two months after Haggai's first preaching, the prophet Zechariah apparently delivered a like message. (The beginning of the original Book of Zechariah has not come down to us, a hortatory passage, Zechariah i, 2–6, having been substituted). By the following February (519 B.C.) the political situation had changed and Darius was rapidly consolidating his power. We have a hint of the disappointment which this occasioned in Palestine in Zechariah i, 12. Nevertheless Zechariah does not lose heart, but believes that the downfall of Persia is still sure to come. Zechariah believed that Zerubbabel could fulfil Jeremiah's prophecy of the " branch " (Jeremiah xxiii, 5),[1] and that he would one day be able to wear a royal crown.

Why were these glowing anticipations disappointed? The Book of Zechariah supplies the answer. In Chapter III we have a hint as to the position between the priests (Zadokite) who accompanied Zerubbabel and those on the spot. As has already been suggested in this article, Zechariah used his influence to keep Joshua, the chief priest, in his office.

The " visions " of Zechariah are word-cartoons: by means of little stories described as dreams, the prophet depicts contemporary political or ecclesiastical events. Thus an attempt to fortify Jerusalem is depicted in Zechariah ii, 1–5. In this incident we have an explanation of the events recorded in Ezra iv. Note that Ezra iv, 1–5, 24*b* is the work of the Chronicler, to which has been added Ezra iv, 6-24*a*, forming what in modern times would be a footnote. Here we learn that at the beginning of the reign of Xerxes (Ahasuerus: 485–464) an accusation was written by " the people of the land " against Judah and Jerusalem, and that the same thing happened again in the days of Artaxerxes (464–424). Although it may well be questioned whether the document quoted in Ezra iv, 11 ff., is genuine, there is no reason for doubting the main facts which entirely explain the Book of Nehemiah, and also the feud between Jews and Edomites (cf. Malachi i with Ezra iv, 23).

[1] " Branch ": shoot, or sucker from the root of a cut-down tree, is what is meant.

According to Ezra vii, 7, Ezra's expedition took place in the seventh year of Artaxerxes, i.e. 458–457 B.C. But in 460 Egypt with the help of Athens revolted and the revolt was not quelled for at least five years. It is improbable that Ezra's expedition would be authorized when it would be necessary to keep open all the roads to the west. Shortly after, in 448, there was a revolt of the Syrian Satrap, Megabyzos.

Nehemiah, hearing of the forlorn state of Jerusalem in December, 446, is given permission to visit Jerusalem in the spring of 445. Something must have happened to commend the Jews to the favour of Artaxerxes just then. Was it the fact that, whereas Samaria had sympathized with the Syrian revolt, Judah had remained loyal?

It must be remembered that at this time there was no actual religious cleavage between Jews and Samaritans, though there was a strong jealousy of Judah on the part of Samaria—a jealousy which would be greatly increased if Judah just now was *in* and Samaria *out of* royal favour.[1] Nehemiah makes it his first business to restore the city wall, for the intense hostility of Samaria and other neighbouring states made it necessary for Jerusalem to be put into a state of defence.

Probably the mission of Ezra occurred between the two visits of Nehemiah. [We may, perhaps, read *twenty-seventh* instead of *seventh* in Ezra vii, 7: this would make the date of Ezra's expedition 438–437 B.C.] The new legal document brought by Ezra may have been the Priestly Code, known as P. Then occurred the second visit of Nehemiah, now appointed Governor of Judah, 433 B.C. He was now able to enforce the new law, which, however, by this time had been combined with the older law JE and D, but so as to make P dominant. Except for the measure of compromise expressed in this combination, Nehemiah was unbending and autocratic in the extreme. The Jews were required to enter into a solemn compact to keep the law. Violent efforts were made to separate Jews from non-Jews. Nehemiah seems to have wished to prevent any possibility of political reunion of Judah with Samaria, and his action made reconciliation impossible. The expulsion from Jerusalem of the Jewish son-in-law of Sanballat (Nehemiah xiii, 28) must have occurred during the later years of Nehemiah's Governorship. [Sanballat is proved by the Elephantiné Papyri to have been the contemporary of Nehemiah.] It is extremely improbable that the Samaritans would ever have accepted P, if it had come to them in the hands of the dismissed priest. It seems, therefore, that although up to 433 the religious union was observed by the Samaritans, the division was complete some twenty years later, and the Samaritans built for themselves a temple on Mount Gerizim, which was to be a rival to the Temple at Jerusalem (cf. St. John iv, 20). This Samaritan Temple lasted for some three centuries, until it was attacked and destroyed by John Hyrcanus (135–104 B.C.).

It must be remembered that the dispersion of the Jews had been going

[1] The hostility of Samaria was directed, not so much against the Tribe of Judah as against the royal Davidic line of which Zerubbabel had been the representative.

on since the seventh century B.C., many Jews in troublous times having left their homes in Palestine to take refuge in Egypt. It is proved by the Egyptian papyri that there were Jewish colonies at Assuan and at Elephantiné: at the latter place a temple was built, in the sixth century, for the worship of Jehovah; but during the reign of Darius II (423–404) this temple was attacked and destroyed by Egyptian priests. In 411 a letter was sent from the Jews at Elephantiné to John, the High Priest of Jerusalem and the nobles of Judæa, asking for help in the rebuilding of the temple. John's attachment to the law of the one sanctuary would naturally indispose him to grant such a request; so in 408 a similar petition was made to Delaiah and Shelemiah, the sons of Sanballat, Governor of Samaria, and another, about the same time, to Bigvai (or Bagoas), Governor of Judah. Shortly after an answer was returned in the names of Delaiah and Bagoas, authorizing the petitioners to claim from the satrap, Arsham, the rebuilding of their temple. This fixes the date of Josephus' story of John's murder of his brother in the Temple at Jerusalem (*Antiquities* XI, Chapter VII); and thus there is no evidence of any oppression of the Jews under Artaxerxes II (Mnemon, 404–358), nor under Artaxerxes III (Ochus, 358–338), except the solitary statement by Eusebius that about 351, a detachment of Jews were transported to Hyrcania.

Josephus' dates sometimes need correction. According to his *Antiquities of the Jews* (Book XI, Chapter VIII), the Samaritan schism, which so greatly affected subsequent Judaism, took place in the High Priesthood of Jaddua, who as High Priest received Alexander the Great on his arrival at Jerusalem in 332. But in his history Josephus has passed over a period of something like eighty years, and we now know that Sanballat, whose daughter married the founder of the Temple on Mount Gerizim, lived much earlier. Since Delaiah and Shelemiah, to whom the petition already mentioned was made in 408, are called " the sons of Sanballat ", this description of them may perhaps suggest that Sanballat was still living, though an old man; and therefore Sanballat's daughter cannot have married the priest whom Josephus calls Manasseh shortly before 323.

Palestinian Jewry therefore in 332 was mainly confined to Judæa. There were communities of Jews who remained loyal to the Jerusalem Temple in Galilee, beyond the Jordan and in Edom; but such communities appear to have been living among heathen, who formed the majority of the population.

The events and characteristics of the Persian period (539–332) may be summed up as follows:

It had been for the Jews a time of disappointment, discouragement, and depression. As has been said, there is no evidence that there had been any definite persecution; but from the time of Zerubbabel friction had been growing between the Jews and the Samaritans, who were determined not to come under Judæan domination; and the Samaritans had watched jealously every effort made to fortify Jerusalem and had reported it to the Persian government. We have seen that one such report

seems to have been sent about 484 and another some years later, probably between 460 and 455, leading to an attack on Jerusalem, in which Edomites as well as Samaritans took part. During the Governorship of Nehemiah conditions were somewhat improved, but it is evident that the population of Judæa as a whole was in great poverty.

Between 424 and 423 the "Bigvai" or Bagoas mentioned above levied a fine of fifty shekels for every lamb sacrificed at the Temple. The pretext for this was that the High Priest John had murdered his brother Jeshua in the Temple. This incident shows on what pretexts Persian governors would squeeze money out of Judæa; but neither Josephus nor anyone else gives any indication of any religious persecution of the Jews, such as is implied, for example, in Psalm xliv, 22, or of any attempt to interfere with the Jewish religion. The transportation, already mentioned, of a detachment of Jews to Hyrcania, about 351 B.C., is reported by Eusebius; but we do not know the reason for this occurrence nor whether the Jews concerned were from Judæa.

It is probable, as has been said, that the publication of the law under Nehemiah took place on the occasion of his second visit to Jerusalem in 433—just a century before the coming of Alexander the Great. During that century or the greater part of it the Jews of Judæa had been living in isolation. Between them and their neighbours, whether Samaritans in the north or Edomites in the south, there was a most bitter feud. Differences not only of religion but of custom and culture would under such circumstances become accentuated. The Palestinian Jew at this period was a man apart, despised by the surrounding peoples for his poverty and powerlessness, and, for his part, scorning his scorners and anxiously looking for the fulfilment of the prophets' anticipations, when the Lord would shake the world by a political catastrophe, which would destroy the Persian Empire and give the Jews freedom and power.

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## CHAPTER VI

## 332–63 B.C.

Then in 332 B.C. came the great change. Alexander the Great advanced along the coast of Syria, taking Tyre and Gaza by siege, and thus becoming master of Palestine.

We can well imagine with what joy the Jews welcomed the downfall of Persia. The Greeks were imbued with democratic ideas unknown in Persia. It was the policy of Alexander to pose as a deliverer from Persian oppression of the Greek cities of Asia Minor; and farther east he and his successors aimed at studding the empire with Hellenic cities which, while remaining subject to the empire, should nevertheless possess

a considerable amount of freedom. In the course of the next century and a half, many new cities were founded and others rebuilt.

The coming of Hellenism, therefore, in the conquest by Alexander meant a great change to such a city as Jerusalem. The country districts would not feel the change to so great an extent; but we may well believe that in 332 the people of Jerusalem were looking forward to a new era of freedom.

It is impossible within the limits of this article to tell even in barest outline the events of the two centuries and a half, following the conquest of the east by Alexander, which directly or indirectly affected the Jews. It is only possible to give some account of those great happenings which are reflected in the Hebrew Scriptures and which have influenced subsequent Judaism.

We have seen what were the political conditions and the frame of mind under the Persian rule, when the Jews of Judæa had to all intents and purposes been shut up in a Ghetto, though the Ghetto was a district and not a mere quarter in a city. With the coming of Hellenism came an opening-up of the world, the like of which had never been known before; and a question which must soon have presented itself to the Jews was what should be their attitude towards the new state of things. Should they remain in the aloofness of the last hundred years, or should they take advantage of the fact that the world was now open to them? Apparently not a few were inclined to adopt the former alternative; but Judaism found a prophet who preached a better message. We have this message in the Book of Jonah. [The only hint that Jonah is to be identified with the Jonah of 2 Kings xiv, 25, is the term " Son of Amittai " (Jonah i, 1), which is probably a gloss by an editor of the book, founded on the verse in 2 Kings. A similar incorrect identification is found in 1 Kings xxii, 28, " Hear, ye peoples, all of you ", which is put into the mouth of Micaiah, the son of Imlah, but which are really the words of Micah the Morasthite (Micah i, 2).]

The assignment to this period of the Book of Jonah, which, though containing some late words, is written in good Hebrew, suggests the question, " What was the language of Palestinian Jewry at this time?"

Down to the close of the Persian period, it is probable that the vernacular of Palestine was mainly Aramaic. In the synagogues—the origin of which we may reasonably assign to the time of Nehemiah—people would hear Hebrew; and it is probable that to the better educated people Hebrew was still the literary language. Though they did their marketing in Aramaic, they could write Hebrew.

The country districts were far less affected by the coming of Hellenism than the large towns. Although certainly as late as 200 B.C. there were people in Jerusalem, such as Jeshua ben Sira (author of Ecclesiasticus) who could write good Hebrew, the tendency would be for Greek to supplant Hebrew as the literary language, Aramaic remaining the vernacular.

From 332 to 323, when Alexander died in Babylon, Palestinian Jewry was probably at peace. In 331 Alexander had subdued Egypt, and the Palestinian Jews would doubtless learn more of their compatriots living in various parts of Egypt, some of whom at least seem as yet not to have received the Law.

At the death of Alexander the heir presumptive was a half-witted person, Philip Aridæus, a son of Philip of Macedon; but Roxana, the daughter of a great Iranian chief whom Alexander had married in 324 and whom he had made his chief queen, was expected to give birth to a child which, if it were a son, would naturally be Alexander's heir. It was arranged that this child, who was born a few months later and was named Alexander, should reign conjointly with Philip, Perdikkas being regent.

On the death of Alexander, Ptolemy, son of Lagos, one of Alexander's generals, proposed a resettlement of the satrapies of the Empire and got himself appointed to Egypt. The rivalries of those who had served as generals under Alexander soon led to strife. In 321 Ptolemy revolted in Egypt against the regent. Perdikkas failed to put down the revolt: his generals, having been joined by Seleucus, who had served under Alexander, mutinied and murdered him. Antigonus was made commander-in-chief of the Macedonian army and Antipater became guardian of the puppet kings. Seleucus was appointed to the Satrapy of Babylonia; but in 316 Antigonus expelled him and he took refuge with Ptolemy in Egypt.

In 317, Philip Aridæus was put to death, leaving the little Alexander (then five years old) nominal king. Ptolemy now held Egypt and southern Syria. Two years later, in 315, Ptolemy, for whom Seleucus acted as general, was driven out of Syria; but in 312 Ptolemy and Seleucus routed the forces of Demetrius, the son of Antigonus, at Gaza, and Seleucus and Ptolemy regained respectively Babylon and Palestine.

The era of the Greeks is reckoned from October, 312 B.C. [1]

The battle of Gaza was great and decisive, but it was outside Jewish territory, and, indeed, most of the fighting since the death of Alexander the Great had probably not directly affected the Jews. In 311 the boy king Alexander was murdered, and in 305 Ptolemy in Egypt and Seleucus in Babylonia assumed the kingly title. In 301 Seleucus added Syria to Babylonia and his other eastern dominions. He claimed Palestine from Ptolemy, but was unable to obtain possession of it. For the most part the fighting between Ptolemy and the Seleucid king did not directly affect Jerusalem.

For a century Palestine formed part of the kingdom of Ptolemy; and the condition of the Jews appears on the whole to have been prosperous, at least as compared with Persian days. When Palestine was under the same government as Egypt, people of Palestinian or Jewish origin in

[1] [Dates have sometimes been wrongly assigned in consequence of a misunderstanding of the mention of 'Assyria'. It should be noted that, not only in Ezra vi, 22 (written during the Greek period) is the name Assyria obviously used for the great Western Asiatic Empire but Herodotus, in more than one place, uses the term 'Assyria' as including Babylonia; and Josephus calls the common Seleucid era "the reckoning of the Assyrians".]

Egypt would be brought into contact with the Jews of Palestine. Of the Jews in Egypt doubtless many had settled before the publication of the Law; and after the revolt of Egypt from Persia, in 460, there would have been practically no communication, in the remainder of the Persian period, between Jews of Judæa and those in Egypt. For during Persian rule, at any rate after the revolt, the Persian Government would discourage coming and going between the Jews of Judæa and their compatriots in Egypt, and this severance would continue until the coming of Alexander the Great.

During the century of Ptolemaic rule in Palestine, the High Priest paid the annual tribute (twenty silver talents) of the Jewish state to Ptolemy's government, the tribute being collected by those who were only too ready to enrich themselves at the expense of their brethren. It is during this period that we find that " poor " begins to be synonymous with " righteous ".

In the reign of Ptolemy II (Philadelphus), whose father had abdicated in his favour in 285, the Law was translated into Greek. Thus the famous Septuagint version of the Hebrew Scriptures began to be prepared. The translation of the Law (and the Law only) into Greek—done with the full approval of the Church at Jerusalem—can only mean that an effort was being made to bring Egyptian Jews into line with their brethren in Palestine. But why was the Septuagint in *Greek*? Aramaic had made its way into Egypt. Surely it was hoped that by the Greek version some of the *non-Jews* might be attracted. The importance of this is obvious.

In the latter part of the third century B.C., the struggle for Palestine was renewed between the house of Seleucus and the house of Ptolemy. In 223 Antiochus III succeeded his father on the Seleucid throne, and in 217, after occupying Galilee and the Plain of Esdraelon and having taken Gaza and Raphiah, he was defeated by Ptolemy. Ptolemaic rule in Palestine did not, however, last much longer; for in 198 the Egyptian forces were defeated at Banias and Palestine passed under Seleucid rule.

The tension was now increasing in Judæa between Hellenisers and strict Jews. In the reign of Seleucus IV (187–176), son of Antiochus III, Oniah was the High Priest at Jerusalem and was ruling well, though not to the satisfaction of the tax-farmers, who sent slanderous reports of him to Seleucus. Oniah went to Antioch to defend himself, and while he was there Seleucus was poisoned by one of his ministers. Demetrius, a boy of fourteen, the son of Seleucus, was the lawful heir; but he was on his way to Rome at the time, and the crown was seized by Antiochus IV (Epiphanes), younger brother of the murdered Seleucus. Simon the Benjamite, the Jewish notable who had slandered Oniah, continued his unpatriotic intrigues with the Seleucid court; so that Oniah could get no redress. Meanwhile, Oniah's brother Jeshua (who Græcised his name as Jason) bribed the Seleucid king to make him High Priest. Jason was a Helleniser, pledged to support the Hellenizing policy of Antiochus Epiphanes, who was determined to unify the heterogeneous elements of

his great empire by imposing on them all the Greek language, law, customs, and religion to which he himself was strongly attached. But the King's strongest attachment was to money; and when another Jew (described as the brother of the before-mentioned Simon the Benjamite and known by his Greek name of Menelaus)—a still more devoted adherent of Hellenism than Jason—offered a larger bribe, the High Priesthood was taken away from Jason and conferred upon Menelaus. Jason fled into the country east of Jordan. Menelaus as High Priest greatly shocked the sensibilities of the Jewish people: he made free with the holy vessels of the Temple: he used his influence at court against Oniah, the dispossessed High Priest, whom soon after Menelaus contrived to get murdered at Antioch. The news of this murder of their old leader greatly shocked the pious Jews; and in consequence Menelaus and the Seleucid government which supported him became abhorrent: Jerusalem was full of discontent: everything was ready for an outbreak. (See 2 Maccabees iii; Zechariah xi, 4 ff. Oniah is probably the shepherd there described.)

Oniah's death caused his brother Jason to be regarded as the legitimate High Priest, and fierce party strife ensued between Jason's supporters and those of Menelaus. In 170, Antiochus Epiphanes was fighting in Egypt and a report spread through Palestine that he was dead. Jason seized the opportunity to return to Jerusalem and attack Menelaus, putting many of his supporters to the sword. But Antiochus was not dead, and he chose to interpret this attack upon his nominee Menelaus, in which the most pronounced Hellenists among the Jews had been the victims, as an act of rebellion against his royal authority. Antiochus, on his way back from Egypt, turned aside to punish Jerusalem. A massacre of Jews by the Seleucid soldiers ensued. In Zechariah xiv it is calculated that of the population of Jerusalem two-thirds were killed or sold into slavery. Antiochus also profaned the Temple, carrying off many of its treasures. This was in 168 B.C.

But still worse was to come. Antiochus' temper was now thoroughly roused against the pious Jews, and he came to the conclusion that there would be no loyalty to his rule till this eccentric Jewish religion was extinguished once for all. He therefore forbade observance of the Law. Circumcision, the keeping of the sabbath, Jewish food taboos, the reading of the Hebrew scriptures were all forbidden under penalty of torture and death. The Temple was transformed into a temple of Olympian Zeus, and swine's flesh was there offered in sacrifice before an image of the god.

Menelaus decided to conform; but some Jews were made of nobler stuff, and a terrible period of religious persecution began in which there were many martyrs, prominent amongst whom was a scribe Eleazar of the Seven Brethren, whose story we read in 2 Maccabees vi and vii. A party of the pious Jews (called the Hasidim or Asidæans, in our version of 1 Maccabees) fled into the wilderness, under the leadership of an old priest of the Hasmonæan family, named Mattathias, and his five sons, of whom Judas Maccabæus was most prominent.

This affliction was to the Hasidim an appalling surprise: they had no belief in a life beyond the grave, the future blessedness of which could more than compensate for the agony they were called upon to endure. The orthodox religious view had always been that irretrievable misfortune fell only upon the wicked; but now that old, easy, comfortable doctrine could be no longer held. Perhaps Psalms xxii and xliv belong to this period of deep gloom, as does also the Book of Daniel. In that latter book the true author writes under the pseudonym Daniel, a Jewish worthy, dead centuries before. In the narrative part of the book stories are told of supposed events in Babylon when Nebuchadnezzar or Belshazzar or Darius ruled there. Heathen kings had been tyrannical then, but Jehovah's true servants had withstood them and had been vindicated. Thus, Daniel and his companions had refused to defile themselves with the king's meat: Shadrach, Meshach, and Abednego had refused to fall down before Nebuchadnezzar's golden image: Nebuchadnezzar's pride had been humbled in madness: Belshazzar's impious use of the sacred vessels of the Temple at his feast had been punished by his defeat and death: the decree of Darius, whereby Daniel was placed in peril of his life, had been rescinded as a result of Daniel's fearless adherence to his religion. The Book was intended to bring comfort and hope to the saints, threatened by Antiochus Epiphanes, a worse tyrant than the old kings of Babylon. (Nebuchadnezzar, Belshazzar, and Darius are thin disguises for Antiochus.)

The revolt of Mattathias was spreading. Judas Maccabæus raised a guerilla force in Judæa and an appeal was made to the Hasidim to put themselves under his standard. After two or three victories won by the troops of Judas over the local forces of the crown, Lysias, the general of Antiochus, was obliged to send part of the imperial army against the insurgents; but the successes of the latter still continued, until in 165 Lysias was obliged to come to terms with Judas, and to give back the Temple to the Maccabees. The Temple was rededicated on 25th December, 165.

Judas, now virtually master of Judæa, with the help of his brothers Jonathan and Simon, next carried out a campaign in Edom, Moab, Ammon, Gilead and Galilee, bringing back to Judæa loyal Jews who had been persecuted in these districts, and also in Samaria and Philistia.

Antiochus Epiphanes had died in 164, and Antioch was in a very unsettled state. This had been advantageous to the Jews, for Lysias had his hands full at home. But the struggle was not yet over. In 163, Judas was defeated at Beth Zachariah and driven back to the country north of Jerusalem. Dissensions in the Seleucid government again obliged Lysias to come to terms with the Maccabees. Menelaus was put to death, but the royal garrison remained at Jerusalem and the defences which the Maccabees held there or had erected were pulled down. Lysias at this time was acting as regent to Antiochus V, the young son of Antiochus Epiphanes.

In 162, Demetrius, the son of Seleucus IV (elder brother of Antiochus

Epiphanes) escaped from Rome, where he had been a hostage, and landed on the Syrian coast. Lysias had made himself unpopular and Demetrius was welcomed by the cities. Lysias and the children of Antiochus Epiphanes were put to death.

A certain descendant of the High Priestly family—Eliakim, who had Hellenised his name as Alcimus—appealed to Demetrius against the Hasmonæans (Maccabees) and got himself appointed High Priest. Demetrius sent a force to install him: there resulted a split between the Hasmonæans and the Hasidim, who hitherto had supported the Hasmonæans. It is a significant fact that Judas and his brothers no longer commanded the support of the party of earnest and pious Jews. The latter were now ready to receive Alcimus: they were soon undeceived, however. Alcimus was actuated by fierce party spirit, and under him the struggle between the two Jewish factions became more acute and occasioned more bloodshed. At length the general of the Seleucid force, whom Demetrius had sent to the installation of Alcimus, expelled the Hasmonæan leaders from Jerusalem; but these were still powerful enough to disturb the peace outside Jerusalem, and the Seleucid army tried to put an end to the trouble by capturing Judas. Failing in this, they met him and his forces in battle and in 161 Judas was slain: his brothers Jonathan, Simon, and John and their adherents were forced to escape to the wilderness. For the time the Hasmonæan cause seemed to have collapsed.

Alcimus, however, did not long enjoy his position as High Priest. He died of a paralytic stroke which by many was thought to be a judgment upon him for attempting some unpopular alterations in the Temple.

In 158, Demetrius consented to allow Jonathan and Simon to return to Judæa. Jonathan had his head-quarters at Michmash and soon became powerful in the country outside Jerusalem. Then came an event which split the Seleucid kingdom and gave the Jews their opportunity. In 152 a young man, known as Alexander Balas, gave out that he was a son of Antiochus Epiphanes, though he was almost certainly an impostor. But, with the support of some of the kings of the east, he set up as a rival king to Demetrius on the coast of Palestine at Ptolemais. Demetrius accordingly was obliged to come to terms with the Hasmonæans, for he needed his forces for the struggle with Alexander Balas. He therefore allowed the Hasmonæans to re-enter Jerusalem and he authorized Jonathan to maintain a military force. Only the citadel in Jerusalem remained in possession of the royal garrison.

Soon after, Alexander Balas, by way of outbidding Demetrius, made Jonathan High Priest. Jonathan made his first appearance in this rôle in 152. It is not known who had acted as High Priest during the nine years before 152.

Two years later (150) Alexander Balas defeated and killed Demetrius. He shortly afterwards married at Ptolemais, the daughter of Ptolemy, who had supported him, and Jonathan was invited to visit the newly-married

king. Jonathan was ennobled by Alexander and was made Governor of Judæa.

In 148–147 Demetrius II, son of the former Demetrius, landed in Syria and was accepted by all Palestine except Judæa and the Philistine cities. Jonathan, acting for Alexander Balas, carried out a victorious campaign in Philistia, was still further ennobled, and was given Ekron as a Jewish possession. Zechariah ix, 1–8, probably refers to these events.

In 145, Alexander Balas, having been deserted by Ptolemy, who now espoused the cause of Demetrius, was routed and killed. Jonathan now came to an understanding with Demetrius, who agreed to forego future claims for the sum of 300 talents paid down. Jonathan's district was enlarged by having attached to it part of Samaria.

Shortly afterwards the inevitable rival claimant appeared in the person of an infant son of Alexander Balas, known as Antiochus Dionysus, whose supporter was a general named Tryphon. The Jews decided to join the side of the son of Alexander Balas, whom they had at one time supported, and thereupon Jonathan espoused his cause. Jonathan was again given the rank which Alexander Balas had given him, and his brother Simon was made military governor of Palestine. Jonathan and Simon took part in fighting, on behalf of Antiochus Dionysus, in Philistia and Galilee, and planted Jewish garrisons in the captured cities. Joppa thus became Jewish. Jonathan was suddenly seized by Tryphon, who began to fear him, and was put to death; but Simon remained in power in Palestine.

In 143–142, Antiochus Dionysus was murdered by Tryphon, who then assumed the crown, though he was not of the Seleucid family. "His action snapped the last link which bound the Jews to his cause" (Dr. Edwyn Bevan). Simon made overtures to Demetrius II, who granted him complete immunity from all tribute. Next year (142–141) the Seleucid garrison in the citadel at Jerusalem finally surrendered, and in May, 141, the victorious Jewish nationalists entered the citadel in triumph. In September, 141, an assembly of the Jewish people held at Jerusalem accepted Simon as leader and High Priest in perpetuity, *until there should arise a faithful prophet*. Many of the people, presumably the Hasidim, had supposed that the dynasty of *David* would be restored as a matter of course; but this was directly opposed to the policy of the Hasmonæans. See Zechariah xii, xiii; Psalm lxxxix, cxxxii, cxxii. Contrast Psalm cx, cxv.

In 138, Demetrius II was taken prisoner by the Parthians, and his younger brother Antiochus VI landed in Syria. He demanded 500 talents from the Hasmonæans as an indemnity for Joppa and Gaza, which they had seized. Simon tried to bargain: he offered 100 talents, but Antioch replied by sending an army to attack Judæa; but Simon's sons, Judas and John, commanded the Jewish army and repulsed the attack. Shortly afterwards Simon was murdered by his son-in-law, who coveted the old man's position: but the murderer's plan was foiled by a rapid march to Jerusalem of John (Hyrcanus), the son of Simon. John Hyrcanus installed himself there as High Priest. Antiochus besieged John in Jerusalem and forced

him to capitulate in the early part of 134. Antiochus behaved with moderation after his victory: he did not reimpose tribute, though he demanded a war indemnity, and he treated the Temple with respect. The Jews were favourably impressed by his conduct; and when his armies moved against the Parthians, a Jewish contingent led by the High Priest John was included (130).

In 129, Antiochus ceased to reign and John Hyrcanus became absolutely independent. He extended the Jewish frontiers, took Shechem and demolished the Samaritan temple on Mount Gerizim. He also compelled those Edomites who had adopted Hellenism to accept circumcision. In the early part of his reign he was much under the influence of the Hasidim, and doubtless many things desired by them were at this time taken over by the Zadokite (i.e. Sadducæan) priesthood.

John Hyrcanus was succeeded in 104 by his son Aristobulus, who assumed the title of king. He still farther extended the Jewish kingdom in Galilee, the Region of the Gentiles. " These, like the Edomites, were obliged to embrace Judaism, and Aristobulus was thus the creator of that Galilee which we know in our Gospels—a region whose population is Jewish in belief and practice, but Gentile to a large degree in descent." In Gospel times " the speech of the Galileans was noted as provincial at Jerusalem, and many of our Lord's Apostles, for all we know, may have been of Ituræan extraction. This part of the work of the Hasmonæan dynasty, preparing as it did the field for Christ, was perhaps, of all that they did in the world, the thing of most durable consequence for the history of mankind." [1]

Aristobulus reigned only one year and was then succeeded (103) by one of his brothers, known as Alexander Jannæus. He was a sort of barbaric chieftain, fierce and sensual, and during his reign of twenty-seven years he carried out many bloody and victorious raids, whereby his kingdom was extended on all sides—north, as far as the Lake of Merom; west, over the Philistine coast from Carmel to Egypt; east, over Bashan and Gilead beyond Jordan. He continued the policy of forcing the conquered to embrace Judaism.

It might be supposed that Jannæus, as a " good Jew ", would be persona grata to the party of the Pharisees which had developed from the party of the Hasidim (or Asidæans) of earlier days: but the very reverse was the case. For the worldly policy of the Hasmonæans had alienated the Hasidim and from the time of John Hyrcanus there had been an open rupture. The Pharisees had demanded that Hyrcanus should cease to usurp the High Priesthood, even if he continued to hold his political office. Hyrcanus had then become a determined enemy of the Pharisees and had tried by force to prevent their distinctive practices. The hostility between the Hasmonæans and the Pharisees became still more acute in the days of Jannæus: the Pharisees went so far, on one occasion, as to incite the mob to insult Jannæus when he was officiating as High Priest

[1] Dr. Edwyn Bevan, *Jerusalem under the High Priests*, Chapter IV.

in the Temple. Jannæus soon after was at war with the Nabatæans, and on his return to Jerusalem after suffering a defeat in which he had lost most of his army, the Jews, led by the Pharisees, revolted. It is strange, indeed, to remember that in this struggle the Jewish people were on one side and a great-nephew of Judas Maccabæus, with an army partly Greek, on the other. The conflict swayed to and fro, but eventually Jannæus put down the insurrection with brutal cruelty, crucifying 800 of the insurgents, according to the account in Josephus. The Pharisaic party fled.

Jannæus died in 76 B.C. He left his High Priesthood to his son and his political power to his widow, Alexandra or Salome. She made peace with the Pharisees, who, however, would not let slip the opportunity to have their revenge. They took vengeance on the Jerusalem aristocracy who had supported Jannæus, and the queen was not strong enough to defend these new victims. The latter found a champion in Aristobulus, the younger son of the late king. The elder son, Hyrcanus II, was officiating as High Priest under his mother's rule.

In 56, Salome (Alexandra) died, and Aristobulus having gained a victory over the partisans of his brother, it was agreed that he should be High Priest as well as king, Hyrcanus retiring.

Thereupon an Idumæan (Edomite), Antipater, who used Hyrcanus as his tool, began a war against Aristobulus; but in 65 Rome intervened between the disputants. In 63 Pompey met Aristobulus and Hyrcanus at Damascus, and when he advanced to Jerusalem, Hyrcanus received him respectfully and conducted him into the Holy of Holies. This was never forgiven by the Pharisees. A petition had been addressed to Pompey by an embassy of the Jewish people, begging him to relieve them of their kings. Aristobulus was deposed. Hyrcanus continued to be High Priest. The Jewish state was to be a division of the Roman province of Syria, now called into being by Pompey, and it was to pay tribute to Rome. Notwithstanding, there was in many Jewish hearts a revival of the hope of the restoration of the line of David. They felt that they had erred in accepting as king one not of the line of David. In a book known as " the Psalms of Solomon ", belonging to this period, we read the thoughts of these Jews. They denounce the Hasmonæan priesthood and kingship and remember that this latter rightfully belonged to the house of David. " Thou, O Lord, didst choose David to be king over Israel, and didst swear unto him touching his seed for ever, that his kingdom should not fail before thee " (Psalms xvii of Solomon). God shall raise up unto Israel at the time ordained the son of David who " shall thrust out the sinners from the inheritance and gather together a holy people whom he shall lead in righteousness ".

It is this hope of the return of the son of David (mainly a *nationalist* hope) which we find in the minds of those who hailed our Lord on His last visit to Jerusalem. It should be strongly insisted upon that this nationalist hope was never encouraged by our Lord, who challenged the scribes to show how the expected Anointed King, whom the people

believed to be called " Lord " in relation to David, could at the same time be called " the Son of David ". Our Lord *refused* to be Son of David in the nationalist sense: this will explain the fact that the very people who had hailed Christ as " Son of David " rejected Him when they found that He repudiated their purely nationalist hopes.

[It is hoped that, whereas the older Scripture teaching generally made practically a vacuum between the time of Malachi and that of our Lord, the last section of this article will show the supreme importance of making the pupils realize that the religious activities of the Jews did not cease for half a millenium, but that throughout the so-called " gap between the Testaments " the gradual discipline and development of the Jewish people was uninterruptedly taking place.]

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CHAPTER VII

# Teaching of the New Testament

It was suggested in an early part of this article that the teacher of Scripture would find more ready help in the preparation of his New Testament than of his Old Testament lessons, and that therefore the greater part of the article would be devoted to a consideration of some Old Testament problems. It would, however, be deplorable if the disproportion in the space allotted to the two Testaments in this article should create any impression that the same disproportion, to the disadvantage of the New Testament, is recommended in the allocation of lessons in school. The authors therefore desire to offer a short final chapter on the teaching of the New Testament, especially during the later years of school life.

If the Old Testament course is being inspired by the best critical methods of Bible study, and the pupils are being led to appreciate the sense and value of the teaching so based, they will, for the most part, be ready to expect and welcome critical methods in New Testament study too, although —since so much more seems here to be at stake—exceptionally careful and reverent handling will be necessary.

The Synoptic Problem must first be tackled: the study of this will grow out of a more advanced and searching course on St. Mark's Gospel, and it will be appropriate for pupils of ages 13–15, especially for those who are in an early stage of what is called Public School education. Choice of schools in Great Britain, in the case of children who receive no part of their education in Primary Schools, is somewhat haphazard, especially during the earlier years of life: so that headmasters and headmistresses of public schools will find, on receiving a batch of new pupils of 13 or 14 years of age, that the previous education of the new recruits has been not

at all standardized, but has been acquired under very varying conditions. Especially is this the case with girls' public schools, where a contingent of new girls entering together will be found to have come, some straight from home-tuition by governesses; some, probably the majority, from private schools—good, bad, or indifferent; some from public day secondary schools. It will be impossible for their new teachers to assume that all these pupils will have been already taken through the elements of their subjects with anything like identity of selection, sequence, or method. Hence, in schools which admit children already in their teens, it will be desirable that the forms receiving such children should devote a year or two to an examination of the foundations, and this may necessitate a recapitulation of much that some pupils will think they have already learnt. It might be especially unfortunate for the Scripture teacher to assume that the Gospel story had already been sufficiently taught. Some new arrivals at a public school will have received no Scripture teaching at all: some others will have done very little systematic work in the subject: no one order or method will have been followed by everybody. This, then, is the reason for the suggestion that the New Testament lessons for the first year or so of public school work should be devoted to the Gospel of St. Mark. If this is postponed to a later stage, it may be found to be, in spite of its shortness and greater simplicity, the hardest of the three Synoptic Gospels to teach, for the reason that, by that time, the teacher will rarely find anything like virgin soil for the planting of its doctrine: the ground will be already occupied by a crop of incongruous but very tenacious plants gathered haphazard from the four Gospel fields, but with fewer from St. Mark's than from the others. Much of one's New Testament knowledge in childhood is, or used to be, picked up in church, where this particular Gospel scarcely gets its due; for example, on only two of the fifty-two Sundays in the year is the Gospel for the day in the Church of England liturgy chosen from St. Mark. There is then a difficulty in making room for the Marcan picture. How, for instance, shall we easily visualize the picture of horrified women rushing away from an empty and supposed rifled grave and saying nothing of the outrage to anybody (St. Mark xvi, 8), when the canvas is already filled with a vivid picture of Mary Magdalene's joyful recognition and proclamation of the risen Master in the earliest hours of Easter Day (St. John xx)?

The teacher, then, needs to do two things.

(*a*) To disentangle what little there is of St. Mark from the students' general store of Gospel knowledge, and to convince them of the importance of isolating, for concentrated study, this particular Gospel's contribution to Christian knowledge and thought.

(*b*) To persuade students to drop a view of our Lord's earthly life, which they cherish as supposed orthodoxy, though it has virtually ousted the article of the Christian creed which declares that " He was made man ".

To accomplish the first of these aims the teacher, in his own preparation, should sit down before three copies of the New Testament, one, immedi-

ately in front, open at St. Mark, the other two, at his elbow, open at St. Matthew and St. Luke respectively. Let him then go rapidly, but systematically, through Mark, after each verse or paragraph looking to see whether the same thing is to be found in Matthew or Luke or both. If it is, he should return to Mark and underline the passage there in red ink. It will be found that almost the whole Gospel comes to be red-inked, only about thirty-five verses escaping this treatment. The fact that almost the whole of Mark is to be found in either Matthew or Luke or both—the similarities being too numerous and close to be due to mere coincidence—suggests two explanations: (i) that two of these Evangelists have borrowed from the third; or (ii) that all three have borrowed from a common source.

The teacher will find, in books given in the appended list, the main reasons for adopting hypothesis (i) and for believing and teaching that St. Mark's Gospel is the earliest of the three, and that Matthew and Luke are largely based upon it. Thus is established St. Mark's claim to most careful study.

The next difficulty will be to induce some of our pupils to put out of their minds the spurious orthodoxy already alluded to, and to try to understand this most primitive picture of the Incarnate Life, in which Jesus is shown, more clearly than in the other records, as a man with human characteristics and limitations. It is not always easy to persuade religiously-minded young people of the conventional type that insistence on the fact of our Lord's complete humanity is no denial of His divinity. So many of them have come to think of Him as a mysterious being, not quite God and not quite man; and it is these pupils to whom this particular Gospel is sometimes a stumbling-block, when their attention is drawn to St. Mark's candid statements—veiled or omitted in the other Gospels—that there were things which Jesus could not do and did not know, or that He was susceptible of the more painful of human emotions, such as anger, disappointment, and even despair. They are reluctant, too, to admit the idea that there was progressive development, both in His spiritual consciousness, and in the plans and methods adopted by Him to suit altering circumstances as He became aware of changing needs and conditions.

When these points arise, it will be useful to devote a lesson or two to the pursuing of St. Mark into the other two Synoptists, noting carefully the important and significant modifications made by Matthew and Luke in taking over Mark's material. Reasons for these modifications must be sought. They can be enlarged upon when we come to study Matthew and Luke more closely.

It will next be desirable to get a rapid bird's-eye view of the course of the Ministry, as given in St. Mark. People often do not read the Bible in large enough portions to see the general trend of events. A rapid survey must be superficial, but when the text is gone through in detail it can be dealt with more thoroughly. A first rapid reading will give an idea of the salient facts of the four periods into which the Ministry can be divided, viz:

1. The Unobstructed Ministry in Galilee, Mark i, 14–iii, 6.
2. The Obstructed Ministry in Galilee, iii, 7–vii, 23.
3. Jesus in retirement, outside Galilee, vii, 24–ix, 50.
4. The last visit to Jerusalem. The Passion narrative, x, 1–xvi, 8.

Recognition of the fact that very few of our Lord's discourses are given in St. Mark may lead us to turn to and compare the non-Marcan parts of Matthew and Luke. It will be useful to underline in blue ink passages (non-Marcan) given by both Matthew and Luke, and to teach what little is known about the supposed source, called Q, of these passages. There will remain the passages in Matthew peculiar to that Gospel, and similarly with Luke.

When the three Synoptic Gospels have been studied in this way, it will be better to leave time for our pupils' impressions to sink in, before attempting a study of the Fourth Gospel. In the interval we can turn to Acts and the Epistles, and then come back to the Gospel of St. John.

HASTINGS, *Dictionary of the Bible* (one volume); *Encyclopædia of Religion and Ethics*; FRAZER, *The Golden Bough*; *Folklore in the Old Testament*; BUCHANAN GRAY, *Sacrifice in the Old Testament*; PEAKE'S *One Volume Bible Commentary*; MOFFATT, *A New Translation of the Bible*; E. R. BEVAN, *The House of Seleucus*; *Jerusalem under the High Priests*; HENDERSON, *A Modern Handbook to the Old Testament* (strongly recommended); J. W. HUNKIN, J. F. BETHUNE-BAKER, *The Christian Religion*: I. The Rise of the Christian Church (Camb. Univ. Press, 1929); HARNACK, *Mission and Expansion of Christianity* (translated from the German); INGE, *Essay on St. Paul*, in *Outspoken Essays*, First Series; STREETER, *The Primitive Church*; *The Four Gospels*; ARMITAGE ROBINSON, *The Study of the Gospels* (an excellent introductory manual); BURKITT, *Earliest Sources for the Life of Jesus*; *The Gospel History and its Transmission*; GLOVER, *The Jesus of History*; VON HÜGEL, *St. John's Gospel*, art in *Encycl. Brit.*, 11th and 13th editions; E. F. SCOTT, *The Fourth Gospel*; GORE, *Jesus of Nazareth* (The Home University Library); R. H. STRACHAN, *The Fourth Gospel*.

Popularly written books, which may be of use to less experienced teachers of Scripture, are:

V. F. STORR, *The Bible and the Modern Mind* (Churchman's Popular Library); H. E. FOSDICK, *The Modern Use of the Bible*; J. M. C. CRUM, *Road-mending on the Sacred Way*.

# GEOGRAPHY

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# GEOGRAPHY

## CHAPTER I

## Introduction

" Geography," writes Professor Fleure,[1] " is one of the oldest of the sciences and it has usually been concerned with the piecing together of knowledge of many different kinds. In a sense most of the specialized sciences can be considered as offshoots of geography, and there is thus a widespread overlap between geographical and other studies, and the determination of the province of geography is unprofitable."

Our task, however, is to ask what is the relation of geography to the curriculum as a whole, and what function does the subject perform when this main purpose is being developed. What this function is as far as school is concerned has been admirably stated by Mr. B. Wallis, who writes: " Boys and girls study geography in order that they may know the world and the men who are at work in it, and thus may do their share of the world's work thoroughly well when they leave school and become citizens. Their knowledge of geography should help them to become better men and women, to make the world a better abiding place for its inhabitants. Geography describes how men live and work. It shows how their lives depend upon the lands they inhabit. It indicates how men's work depends chiefly upon the kind of climate which occurs where they live."[2]

However simply one may set out these aims, the teacher has always to solve one important problem. He is continually faced with large masses of details, all of which appear to be important, yet if given to the child would create for him an unnecessary burden. And side by side with this constant need for selection is the fact that limitations are ever present to his desire to explain certain phenomena or suggest reasons for particular circumstances,[3] because the pupils have not reached a stage when they understand sufficient of scientific principles to comprehend, say, the influence of climate upon plant growth. As in all subjects, the

[1] *Introduction to Geography* (Benn). [2] Wallis, *Junior Geography of the World*, p. 4.
[3] Such for example as the growth of wheat in India.

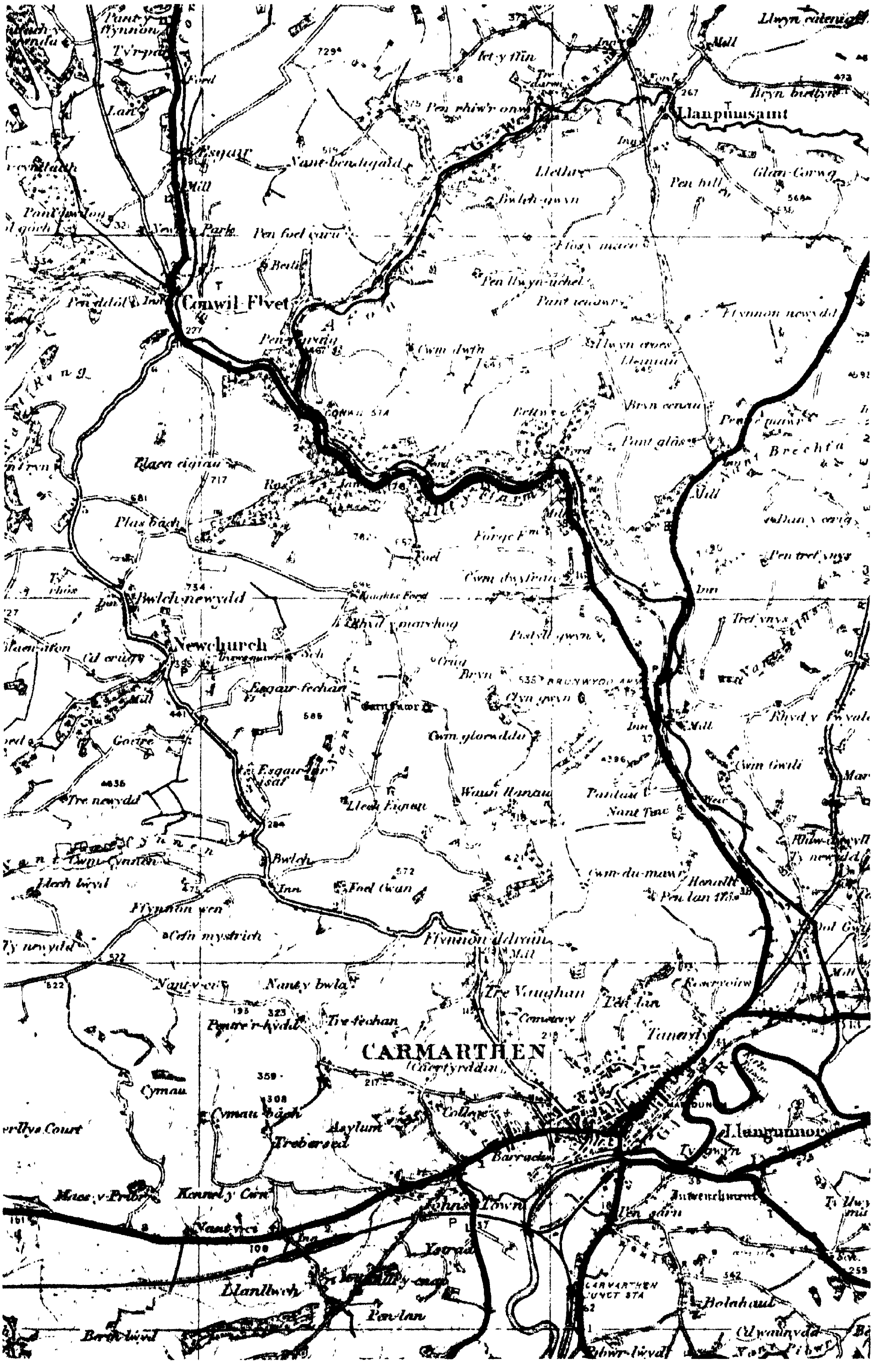
capacity and development of the child must ever be kept in mind in deciding what aspects of geography shall be included in the curriculum.

Broadly speaking, it may be said that geography, as such, has no place in the child's study before eight or nine years of age. Yet the very young child may acquire many ideas, both from observation and direct instruction, which are fundamental, especially about the ways of nature and its seasonal changes, the district in which he lives—its roads, its houses, its shops—and, through stories well told or expressed in simple language as reading material, about the lives of children and people under conditions differing widely from our own. At this early stage children are busy collecting impressions of things and their relations, and becoming familiar with words in which to express them. This work is far more important than the acquisition of what is termed accurate knowledge, e.g. of the number of miles from one town to another, the names of capes and bays along a certain coast, or the list of exports from a particular country.

The second stage includes the remaining years of the junior school, which in future will end about the age of eleven years. At this period the filling in of details to provide the necessary light and shade will still continue. A beginning should be made with the more systematic study of particular areas and their relations, though emphasis should be placed more upon description than upon the deduction of principles. The proper method which should be adopted has not yet been satisfactorily found, though many have been tried. On the one side geography should be observational, so local geography ought to be a definite part of the teaching, including the use and perhaps construction of simple maps. Secondly, a study of the home country should be begun, not necessarily of the whole of Great Britain, but of England and Wales, since some of the names will have already become familiar to the children, and as nowadays travelling long distances by train, charabanc, or motor has become common. Thirdly, there is much to be said for accustoming the children to a world map quite early in life. They should be given the main details of coastline, mountain, and river and encouraged to gain information as to the kind of life led by people who live in the better known and very distinctive regions.

The third stage, as indicated in the *Suggestions*,[1] brings us to the threshold of the subject proper, the first stage of a formal study of geography. It matters little to what type of school the child will go, whether secondary or central or senior division, the main aim is the same. He will now take up an inquiry into the world as a whole, and base this on some recognized principles. Its development must depend on the length of the course, the conditions of study and the opportunities available. The *Suggestions*, for example, recognize that great variety is possible in the courses, dependent upon the particular interests of the teachers and upon the purpose of the school training. A central school with a commercial bias would include many details and emphasize certain aspects which

[1] *Handbook of Suggestions to Teachers*, Board of Education, 1927.




PORTION OF ORDNANCE SURVEY MAP: ONE INCH

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would find no place in a school preparing children for a First Schools Examination, or, contrariwise, for artisan occupations.

With only three years in the senior school, or its equivalent, the whole world cannot be covered in detail, nor can a discussion of the causes be fully understood. It is not uncommon to find a general survey of the world with special attention given to the parts forming the British dominions, and a review of the same with extensions to bring out the trade of Britain with the world as a whole.

As the scheme of reorganization becomes stabilized, it will, however, be possible to regard a four years' course as the normal limit, and so the scope of the work in geography will probably be similar in all types of schools, even though the same examinations be not taken.

## Schemes of Work

In order to assist teachers to see the wide variations which are possible in planning the work, we give below a series of schemes which have been developed successfully in different parts of the country, and which the authors have kindly allowed us to use.

### I. A Rural Mixed School of 130 Children under 4 Teachers

*Standard I.*

1. *Home Geography:* Observation and conversation, e.g. School on the hill. Stream at foot of hill. Roads to the parishes. People we meet: Farmworkers. Tradesmen—the things they buy and sell. Postmen. Lorry drivers. Buses on the turnpike.

2. *World Geography:* By comparison and contrast develop from above child life in main climatic regions of world. Norwegians. Swiss. Khirgis. Eskimos. Negroes. Bedouin Arabs. Red Indians. Pigmies. Greeks. Japanese.

3. *Expression Work:* Pastel, paper cutting, plasticine as media for " settings " of stories. Colouring traced pictures, outlines.

*Standards II and III.*—(Two sections, combined for one weekly lesson. Upper section commencing regional study.)

1. *Home Geography:* Observational nature science, e.g. the seasons' changes. The sun's apparent movements. Work in fields around. The stream.

2. *World Geography:* Lessons based on a broad survey of earth's surface. First traveller in land of blacks. Life in land of blacks. An old-fashioned English village. Under the ploughshare in India. Chinese farmers and Mongol shepherds. Changes in grasslands. Changes in forests. Wealth of mountains. Wealth of the sea. Wealth buried underground. Wealth made by machinery. Traffic and transport. Towns and cities.

3. *Regional:* Great Britain broadly treated. Bread lands. Orchard lands. Pennine moorlands. Market towns. Factory towns of north. Ports and fishing (October). Transport.

4. *Expression Work:* Filling in and colouring traced maps of neighbourhood, Norfolk, and England to illustrate grasslands, arable lands, rainfall, population, &c. Simple map-making in plasticine. Simple weather charts.

*Standards IV and V.*—(Two sections, combined occasionally for home and world geography.)

1. *Home Geography:* Observational nature rambles. Characters and destinations of roads. Mapping the parishes around.

2. *World Geography:* Oral teaching on chief climatic regions of the world. Approached with points of view so that the following elements are related:

Physical and climatic conditions that go to form regions. Characteristics of inhabitants. Conditions and effects of their work.

Polar regions and tundra. Northern forests and temperate regions. Mediterranean regions. Warm temperate regions. Monsoon regions. Tropical lands. Deserts.

*3. Regional* (*Standard IV*).—More definite study of some country. Physical features, climate. Agriculture. Fishing. Minerals. Cotton, woollen, iron industries. Potteries. Shipbuilding. Basin of Trent. East Anglia. Basin of Thames. Southern counties. The Weald. Hampshire Basin. Pennine moorlands. Lake District. Welsh Border. Wales.

*Standard V.*—Trade routes between England and Continent. General geography of Europe treated as follows:

Physical and climatic conditions. Vegetation and animal life. Minerals. Industries. Transport. Distribution of population.

*Expression Work:* Filling in and colouring traced maps of England and her Continental neighbours, showing trade routes, physical features, vegetation, transport, population. Keeping temperature records and wind charts.

*Standards VI and VII.*—(Two sections. Combined work for home and world geography.)

*1. Home Geography:* Use of 1-in. and 6-in. ordnance maps. Connexion between geography, nature study, and gardening. Map making—showing distribution of farm lands of neighbourhood, and cropping. Round the neighbourhood by cycle and bus. Market days.

*2. World Geography:* Some class work in history of exploration from seeking trade routes to east in fifteenth century to Polar discoveries, and Mount Everest attempts. Lessons of outstanding interest from current issues of *Teachers' World.*

*3. Regional* (*Standard VI*).—Assignments set for private study and written works on British colonies.

*Standards VII and Ex. VII.*—Assignments set for private study and written work on the world (commercially treated). Geography through reading, especially about British Isles and from descriptive geographies.

## II.—A Senior Mixed School with Three Divisions to each Class, (I) A Higher Top, (II) Normal Children, (III) Subnormal Children

(I) The higher top is subdivided into Preparatory and Forms I, II, and III. The other groups still retain the titles of Standards V, VI, VII, and VIII.

The schemes are based on what the better children can attempt; the other classes follow the same schemes, but in much less detail and with less private study.

*Preparatory Form.*—(i) Relation of man to his environment. (ii) A study of the British Isles, laying emphasis upon geographical principles as they arise. (iii) Map studies and problem exercises on the Home Country. (iv) Causes leading to the growth of towns.

*Form I.*—Study of the New World following similar lines. Emphasis laid upon relation of wind and rain belts upon vegetation.

*Form II.*—Study of the Old World following similar lines. The method adopted is to spend a period each week upon (i) independent study with a definite aim; (ii) oral lesson to supply matter additional to what the textbook contains, or to test results of study; (iii) practical or written work.

The Old World is treated in climatic regions so that children gain a clear idea of the types of countries that exist and some understanding of geographical principles and their application. The globe and map are in constant use for comparative study. Africa will be taken first because of its position with reference to the equator: Eurasia next with special reference to the isotherms, influence of the sea, and proximity of land masses. A special study of monsoons will be attempted.

The same principles will be applied to Australia and Europe, noting how the latter is specially fitted to produce healthy, active, and progressive peoples.

*Form III.*—Final revision of work done previously with a study of Europe and the British Isles.

The political aspect of the subject will be especially emphasized, e.g. reasons

why certain areas form political unity; reasons for choice of particular places as centres of government. This necessitates consideration of the historical, physical, climatic, and commercial aspects of geography.

The home area will be studied in detail. Considerable attention will be given to making of maps to illustrate special points; the filling in of blank maps; making of charts, diagrams, and models; map-reading exercises and preparations of summaries.

### III.—A Town School, of all Standards, with a Specialist taking Geography throughout

*Class I*

A. Local features of river and coast.

The harbour.

The coast: shore lights, buoys, light-ships, life-buoys, piers; difficulties of navigation.

Local occupations: Fishermen, farmers, market gardeners, hotel and boarding-house proprietors.

Story lessons of children in various parts of the British Isles: Lake District, Black Country, Potteries, Cotton District, Yorkshire Moors, London Docks, Coal Districts, Highlands, Clydeside, Irish Plain.

B. Children of main climatic regions. Comparison and contrast of lives and habits according to surroundings.

1. Boys of Europe: France, Spain, Holland, Italy, Rhineland, Switzerland, Norway, Russia, Lapland.

2. Boys of Distant Lands: India, Canada, South America, Australia, Arabia, China, Japan.

Direction: Cardinal points. Wind vane. Sketch plan of room and prominent objects in it.

C. My shadow.

Globe and lighted lamp to show day and night.

*Class II*

A. Local routes and railways—where they lead to, and why. What they carry (in and out).

Kinds of traffic on roads.

Occupations in various parts of the British Isles—miners, factory workers, dock workers, bargemen, cattle farmers, wheat farmers, shipbuilders, sailors, railwaymen, postmen, shepherds.

Means of travel and transport.

Scenery in various parts.

B. Descriptive talks about children of other lands, with special reference to homes, food, clothing, occupations, means of travel and transport—Negro (cotton), Red Indian (hunting), Arab (desert), Eskimo (snow and ice), Pacific Islander (fruits, spices, nuts), Pigmy (forest hunters), Swiss (cowherd), Cowboy (prairies), Chinese (rice and tea), Landes (stilt-walkers), Central Europe (forests, toy-making).

C. Simple wind-rose.

Sketch plan of room and surrounding rooms.

Plan of playground showing cardinal points.

My route to school (sketch plan).

*Class III*

A. Elementary notions of contours (three layers).

British Isles. General survey. Position and boundaries. Mountains and hills. Plains and valleys. Rivers. Counties. Annual rainfall. Agriculture. Rocks and minerals. Coalfields and factories. Population and trade.

Our market. Local productions. Fish, farm produce, cattle. Market gardens.

B. Chief world routes practically—following voyages of actual ships of world from shipping columns of daily papers.

C. Keep simple wind rose, a.m. and p.m.

Simple scale plan of classroom, playground.
Relief models of England and Wales.
Simplified town plan.

*Class IV*

A. *British Isles.*—Effect of build of country on climate, on plant and animal life, on occupations and commerce.

Trace connexion between build, rainfall, pasture, and plough lands, fruit districts, cheese and cattle lands, wheat lands, on suitable maps.

Extend connexion to stock farming, dairy farming, wheat growing, milling, woollen and leather industries.

Manufacturing areas: cotton, woollen, hardware, pottery, coal-fields, steel, shipbuilding (Clyde), linen (Ireland).

B. *The World.*—Shape, size, distribution of land and water. Alpine mountains, great plateaux, and world plains.

Great rivers and their characters: Rivers of Siberia, North Russia, and Canada; the Nile, Euphrates, and Tigris; the Indus, the Amazon, and the Congo; the Mississippi and the St. Lawrence.

Midland and inland seas.

Voyages of Marco Polo, Vasco da Gama, Drake, Magellan, Franklin, Cook.

C. Relief models illustrating the above.

Further contours.

Maps from models and models from maps.

Sections. (Illustrate by cutting plasticine models.) Weather and shadow records.

*Class V (in detail)*

*Europe* (General). Position and build. Rivers and lakes. Climate and vegetation. Minerals. Population. Communications.

Areas for detailed study: The Baltic Lands. The Mediterranean Lands. France, industrial regions. Germany, industrial regions.

*Asia* (General). Position and build. Rivers and lakes. Climate, vegetation, animals. Minerals. Population. Communications.

Areas for detailed study. The Siberian Plains. The Monsoon Region (with special attention to India). The Japanese Islands.

*Class VI (in detail)*

*Africa* (General). Highlands—masses, ranges, plateaux, with effect on rainfall, climate, and vegetation.

Regions—winter rain, desert, savannah, equatorial forests, dry scrub, summer rain.

Areas for detailed study: Nile, Congo, and Niger valleys. Union of South Africa.

*Australasia* (General). Parched rivers—cause, and effect on vegetation. Build and position. Rainfall and vegetation regions. States of Australia. Tasmania. New Zealand.

*Norfolk.* Structure. Rivers and Broads. Local occupations. Map journeys by road, rail, and river. Cross sections to illustrate build. Ordnance maps.

*Class VII (the top class). First Year*

*The Americas.*

South America (General). Position, extent, build. Climatic and vegetation regions. Rainfall regions. Countries—population and occupations.

Areas for special study: The grass lands of Argentina. Mineral areas of the West.

North America (General). Position, extent, build. Climatic and vegetation regions.

Occupations and communications: Canada. United States. Central America. West Indies. Special attention to the wheat, maize, cotton, and tobacco belts. Forest and mining areas.

*Class VII. Second Year*

*Britain and British Trade.*

British Isles and the Atlantic. Climate and weather. Agricultural and pastoral regions. Mineral regions. Origin and development of woollen, cotton, iron, and steel, shipbuilding, linen, silk, jute, and hemp, chemical industries. Railways and canals. Overseas trade. Shipping and trade routes. Ports.

### IV.—A Boy's Selective Central School with a Four-year Course for Boys over 11 who are collected from a Semi-urban and Rural District

In each year, with the exception of the fourth, one region north and one south of the equator will be studied; in this way the climatic differences between the northern and southern hemispheres and their effects on the life and activities of man will be emphasized.

In addition to the regional geography proposed for the first and second years, elementary climatology and map-making will be included, together with a study of the chief forces at work modifying the land surface of the globe. A thorough training in the reading of the many types of maps, diagrams, and geographical "shorthand" in general will be given, and deductive exercises set, so that in the third and fourth years the boys shall be able to undertake for themselves, with a minimum of oral teaching, the study of the regions proposed, using maps, statistics, and books. Thus they will be in a position to prosecute the study of the subject after leaving school.

The geography of a region will be studied according to a consistent plan which will include: position, relief, climate, vegetation, mineral deposits, occupations and distribution of population; products and trade communications and trade routes. Maps and diagrams will be constructed to illustrate the facts.

The regional work proposed for the fourth year is the geography of the British Isles in detail. The relationship of these islands to the rest of the world will be strongly emphasized, especially from the economic point of view. In the third and fourth years it is also proposed to study in some detail the chief facts of the economic geography of the world: its resources, agriculture, minerals, power. The proposed history syllabus provides for the study of the Industrial Revolution in the fourth year, and every effort will be made to associate the two aspects of a great subject, The Modern Industrial Development of the World, and many lessons will combine the two subjects rather than remain distinctly geographical or historical.

The human point of view will be fully maintained by helping the boys to appreciate the romance of geography and by attempting to interest them in literary works descriptive of the regions under consideration. It is hoped to build up a comprehensive geographical section in the school reference library, and boys will be encouraged to make use of the public library. In this connexion booklets dealing with closely allied subjects will be prepared by individual boys and bound into one volume suitable for the reference library.

Wherever some geographical principle or formation can be illustrated locally this will be done, and, where advisable, excursions will be made to the places concerned.

Periodical lantern lectures will be arranged, and boys will be encouraged to see films of a really educational type whenever they are shown in the city.

*First Year*

1. North and South America.
2. Latitude and longitude.
3. Movements of the earth in relation to the sun.
4. Consequent effect on climate, e.g. atmosphere, distribution and variation of insolation, temperature, pressure, precipitation, other influences on climate. Preparation and interpretation of weather maps. Chief vegetation regions of the world; relation to climate.

*Second Year*

1. Asia and Australasia.
2. Ocean currents and tides.
3. The compass. Map-making and map-reading; contour lines, hachures, the gradual progress to the interpretation of the ordnance survey map.
4. Mountain formation. River-work. Glaciers and the Ice Age. Elevation and depression, drowned villages, earthquakes, volcanoes, denudation.

*Third Year*

1. Europe and Africa.
2. World-agriculture; range and distribution of the chief crops and agricultural products, by diagram and otherwise; use and appreciation of statistics. Conquest of nature; irrigation, dry-farming, scientific farming.
3. Lumbering.

*Fourth Year*

1. British Isles in some detail; history syllabus suggests study of Industrial Revolution, and geography will be dealt with in close correlation.
2. Mining; range and distribution of chief minerals of economic importance. Methods of mining and working.
3. World resources of power; electricity, coal, oil.
4. Fishing; chief fishing areas of the world.
5. Manufactures; comparative importance of those of the chief manufacturing countries.

*N.B.*—Form A (upper section) consists of fourth year boys and will follow the syllabus of the Cambridge School Certificate Examination.

TEXTBOOKS IN USE:

SWEETING, *The Americas.*
SWEETING, *Europe and the Mediterranean Lands.*
FAIRGRIEVE AND YOUNG, *Human Geographies for Secondary Schools*, Books 1, 2, 3.
SWEETING, *Experimental Geography.*
UNSTEAD AND TAYLOR, *Essentials of World Geography.*
BOSWORTH, *Cambridge Senior Geography* (*Asia; Africa; Europe; America; Australasia.*)
*The New School Atlas* (Philips).
*The Comparative Atlas* (Meiklejohn).
*The Visual Contour Atlas* (Philips).

*Books to be found in the School Reference Library*

MCFARLANE, *Economic Geography.*
UNSTEAD AND TAYLOR, *General and Regional Geography.*
J. RUSSELL SMITH, *Industrial and Commercial Geography.*
WILMORE, *Groundwork of Modern Geography.*
BRYANT AND HUGHES, *Mapwork.*
*Oxford Advanced Atlas* (Bartholomew).
*Landform Mapbook.*
NORFOLK, *Cambridge County Geography.*
*Practical Exercises in Geography* (with Key).
*Geography Exercise Book. Europe.*
*A Graded Course in Geography.*
*A Little Book on Map Projections.*
*Geography through Map-reading.*
*Exercises on Ordnance Maps.*
This list has been slightly extended recently.

*More General Books in the School Library*

*South with Scott.*
YOUNG, *Adventures of Exploration*, Book 6.

*Nature's Mystic Movements* (McDougall).
*The Wonderbook of the Wild.*
*Scott's Last Expedition.*
*The Cruise of the Cachalot.*
SIR HARRY JOHNSTON, *The Opening Up of Africa.*
LORD ANSON, *A Voyage Round the World.*
HENRY DRUMMOND, *Tropical Africa.*

### V.—A BOY'S SELECTIVE CENTRAL SCHOOL IN A COLLIERY DISTRICT

*1st Year*

I. *British Isles*, under the following headings: World Position and General Build. Natural Physical Regions. Climate (use of local statistics). Agriculture and Fisheries. Minerals. Industrial Regions. Communications, Trade, and Transport.

II. *North and South America:* Broad comparison of the build and physical features of the Old and New Worlds.

*North America:* Natural physical regions—descriptions of scenery, vegetation, industries and productions of each natural region (e.g. descriptive lessons on such topics as " Trapping in the Canadian North-West ", " The Life of a Farmer in the Prairie Lands ").

*South America*: Compare and contrast the build and drainage of the two continents. Division into natural physical regions, as for North America. Analogies and comparisons with North America whenever possible, e.g. Pampas and Prairies—the work of the Gauchos and Cowboy—Chile and Arizona deserts. No division into climatic types, mention of climate in a general manner during the study of the natural regions of the two continents.

III. *Principles:* Shape, size, and movements of the earth. Latitude, longitude, and time. Climate, climatic terms—local statistics. Direction and distance. Weathering agents.

*2nd Year*

I. *Regional Geography:* A brief study of the remaining continents of the world under the following headings: Position and physical features. Climate. Vegetation (natural, cultivated). Fisheries. Lumbering. Minerals. Manufactures. Europe studied in more detail than the other continents.

II. *Principles:* Earth movements—the seasons—day and night. Wind zones and pressure belts. Rainfall distribution. Contours—sections—representation of heights.

*3rd Year*

I. *British Empire*, each unit treated separately. Trade routes to the mother country. (Cf. explorers' and colonists' routes.) World trade of the colonies.

II. *British Isles*, a more detailed study than for the 1st year.

III. *Principles:* Wind movements—air pressure. Ocean movements—currents and tides. Climate—more detailed study of determining factors—climatic types. Monsoons. Contours, sections, &c. Map projection. Rocks—weathering agents. Earth movements. Vegetation types—vegetable products of the world. Human geography.

*Alternative Course in Principles:* Contours, sections, &c. Use of ordnance survey signs and maps—elementary surveying—use of chain, compass, plane table and theodolite. Commercial geography—trade routes and centres—world ports—their position, hinterland, exports and imports. Comparison of Empire and world products in quantity and value.

*4th Year.* (Oxford School Certificate Syllabus.)

I. *British Isles*—a detailed study—private reading—revision by means of suitable Oxford School Certificate Questions.

II. *North and South America*—a regional study, with the northern continent in more detail.

III. *General Geography:*

(*a*) The earth in space. Its form and movements.
(*b*) Construction and use of maps.
(*c*) The elements of physical geography.

1. Distribution of land and water. Agencies affecting scenery. Common types of land forms. Configuration and drainage of the continents.
2. The earth's atmosphere. Principal factors determining climate. Distribution of winds, temperature, and rainfall. Climatic types and their distribution over the earth's surface.
3. The geography of vegetation and its control by climate, soil, and relief. The distribution and characteristics of the principal types of forests of grasslands and of deserts. Animal life associated with these types.

(*d*) The elements of human geography. Distribution of population and variation of human activities in relation to the above physical conditions. The geography of simple social types (pastoral nomads, agricultural communities, &c.). Geographical factors affecting the localization of industries with special reference to the great manufacturing regions of the world. Geographical conditions (resources, power, labour, markets, lines of communication and means of transport) affecting commerce and industry.

### Books used in Connexion with the above Scheme

*First Year.*—Ferguson Savage, *A Junior Regional Geography of the British Isles.*

*Second Year.*—1. Franklin, *Atlas Geography of Europe.*
2. Reynolds, *Junior Regional Geography of Europe.*

*Third Year.*—1. Herbertson, *Man and His Work.*
2. Parkinson, *A Junior Geography of the British Isles.*
3. Parkinson, *Atlas of Practical Geography:* (*a*) Australia; (*b*) Canada; (*c*) India.

*Fourth Year.*—1. Morley Davies, *British Isles.*
2. Unstead and Taylor, *World Essentials.*
3. Matheson, *North America.*
4. Taylor, *A Sketch Map Geography.*

## VI.—A Selective Central School [London] for Boys (with a Commercial Bias)

*General Method of Treatment*

1. The principles of geography to be thoroughly grasped, i.e. a close study of different physical environments and the effect of these environments on the occupations and activities of mankind.
2. The application of these principles to the particular regions studied each year.
3. Each continent or area to be studied as follows:

(*a*) On a scientific basis to bring out the interaction of the various phenomena, i.e. physical, geological (to suit teacher's purpose), minerals, isotherms (July and January), isobars, winds and rainfall (for July and January), seasonal rainfall, natural vegetation.

(*b*) From the above, work out the effect of this environment on man and the effect of man upon his environment, i.e. distribution of population, occupations, productions, towns, ports, routes, railways, &c.

(*c*) On a regional basis, i.e. each country or continent to be divided up into its own natural regions and the most striking regions to be studied as units; e.g.:

(i) In Asia: The great northern plains, India, &c.
(ii) In Europe: The Paris basin, the north German plain, the Rhine area (divided into its natural regions).
(iii) In the British Isles: The south-east English plain, the Weald, the Scottish rift valley.

(iv) In Africa: The tropical forests area, the Savannahs, the Nile basin (divided into natural regions).
(v) In America: The Mississippi basin, the east coastal plain, California, the Pennsylvanian basin.

4. The teaching of the principles of physical geography should be illustrated by reference to actual examples, and as far as possible should form part of the regional studies.

5. The geography teaching of any area should have a solid physical basis (i.e. emphasis must be laid on the physical features and how these physical features have arisen) so that children look at geography in terms of " time ".

Awe and wonder should be inspired at the enormous changes that have occurred in order to bring our earth to its present condition, with its present physical features and climatic conditions. To do this there must be a geological basis, very broad in the first years of teaching.

6. Description is all-important; it is the antidote to the over-scientific treatment. The places studied must be made real. Vivid descriptions, traveller's accounts, pictures (postcards, illustrations, &c.), should all be placed before the class, who should be encouraged to make their own collections. E.g. pamphlets, postcards, stamps, labels from goods, &c.

*Form I (11–12 years)*

*British Isles.*—Treatment to be on broad lines rather than detailed. The whole should be worked round the physical basis with particular reference to the geology of the area.

(1) Geological history of the south-east plain and Weald. (2) Geological pictures of the bigger coal-fields. (3) British Isles as part of Europe. (4) Continental shelf and its fisheries. (5) Coast lines and harbours. (6) Leading physical features. (7) Drainage areas. (8) Winter and summer isotherms. (9) Winds and rainfall. (10) Natural vegetation. (11) Distribution of mineral wealth: industries dependent. (12) Distribution of population. (13) Railways. (14) Industrial areas: agricultural areas. (15) British Isles on a regional basis.

*Europe.*—(1) Europe as a continent. (2) Coast of Europe. (3) Physical Europe. (4) Climate of Europe. (5) Coal-fields. (6) Population. (7) Railways. (8) Agricultural and pastoral industries of Europe. (9) Industrial areas of Europe. (10) Ports of Europe. (11) Europe treated on a regional basis.

*Form II (12–13 years)*

*The Americas.*—The Americas as a whole: their discovery: physical features: drainage areas: climate: natural vegetation: commercial products: distribution of population: ports, large towns, and railways: Americas treated regionally.

*Africa.*—Africa as a whole: its discovery: physical features and structure: drainage areas: climate and rainfall: natural vegetation: commercial products: population: ports: chief towns and railways: opening up of Africa: regional studies.

*Form III (13–14 years)*

By this time the boys should be able to follow the method and its line of argument themselves. The preliminary treatment will be taken more quickly in order to find time to deal in greater detail with certain technicalities, especially the connexion of man with his environment, e.g.:

Asia and Australasia are treated together from the point of view of:

1. Climatic unity from the Arctic to the Atlantic as seen in America and Africa.
2. Striking differences as seen by conservatism of Asiatic methods and modernism of young Australian Commonwealth and New Zealand.
3. Population in relation to food supply—using Australia to illustrate the point.
4. Political and geographical questions involved in: (i) white policy of Australia; (ii) rise of Japan as a great nation; (iii) the yellow peril; (iv) home rule for India; (v) development of China.

It is not to be expected that boys can go deeply into such problems, nevertheless it is good that they should be introduced to them in the scientific atmosphere of the classroom. (Needless to say, these topics must be handled with very great discretion.)

*Asia.*—Asia as a whole: its extent and variety: its physical features and structure: drainage areas: its climate and natural vegetation: its natural regions: distribution of population: its ports, chief towns, routes and railways: a regional study of Asia.

*Australasia.*—Australasia as a whole: its world position: its structural divisions, physical features, drainage areas, climate, natural vegetation: distribution of population, occupations and their distribution. The discovery and settlement of Australia: its mineral wealth: railways and commerce. Regional studies of Australasia.

*Form IV*

Geographical basis of industry and commerce, showing the importance of the great nations of the world to-day.

Great commodities of the world. Each to be studied from the geographical surroundings of soil, climate, &c. Much of the work should be done by individual study, leading to lecturettes and monographs by the boys on subjects like the following:

Trade in these commodities.

Great nations treated in their world setting.

The great commodities and their usage by man.

Transport.

Importance of coal and iron as the basis of modern life.

The Industrial Revolution as affecting nations other than our own.

The geographical background of history.

Newspaper geography.

The particular topics on which boys should be asked to prepare special studies might be (*a*) each of the great commodities, (*b*) special areas with marked and interesting geographical features, e.g. broader topics such as exploration of Africa, or the great canals.

*Form V*

The course here should be a preparation for the School Leaving Certificate, but to include a thorough revision of the previous four years' work and to deal with the physical basis of geography as well as the British Isles in detail.

## VII.—This new Scheme prepared for the Oxford Junior Local Examination —an Examination frequently taken by Selective Central Schools—is interesting and is inserted for comparison

A. *Regional Geography*

Candidates will be expected to show a knowledge of the regional geography of Great Britain and either Africa or America north of the Panama Canal (including the West Indies).

The study of the continent should be used as a means of illustrating the general principles both of physical and of human geography as indicated in B and C (below). (Candidates who select Africa are recommended to make use of the narratives of the leading explorers, such as Mungo Park, Speke, Moffat, Stanley, Livingstone, Selous. Selections from such stories should be used to present a picture of the country and of the life of the inhabitants in relation to their surroundings.)

In the study of Great Britain emphasis should be laid on the physical aspects of the country (relief, climate, and the vegetation of the major regions); the distribution of population and of the chief agricultural and manufacturing industries; the principal commercial, industrial, and fishing ports, and lines of communication.

The regular and systematic use of a good atlas is assumed, and candidates are expected to be familiar with the methods of representing geographical facts upon a map.

B. *General Principles of Physical Geography*

1. The shape and movements of the earth. Causes and distribution of day and night, and of the seasons. Use of lines of latitude and longitude.

2. The chief materials of the earth's crust. The development of the present surface features of the earth. The formation and characteristics of mountains, plateaux, valleys, plains, coastlines, and islands. Meaning of a drainage basin.

3. The atmosphere; its temperature, moisture, movements, studied in relation

to one another and by means of local observations. A very elementary knowledge of the weather conditions of the British Isles based upon the daily weather report. Wind systems. Types of climate and their distribution over the earth's surface.

4. The oceans, their distribution and currents, their influence on climate, on communications, and as a source of food.

5. The combined influence of surface features, soil, and climate upon the growth of plants. The distribution and chief characteristics of tropical and of temperate grasslands; of equatorial, monsoon, and temperate forests. The conditions suitable for the life of the following: the lion, tiger, elephant, kangaroo, camel, reindeer; the mosquito, tsetse fly; the horse, cattle, sheep; the whale, the chief edible fishes. The chief conditions suitable for and the methods used in the production of wheat, maize, rice, cotton, rubber.

Throughout the study of the physical factors emphasis should be laid upon their significance for man.

C. *The Elementary Principles of Human Geography*

The mode of life (*a*) of typical simple communities (e.g. steppe dwellers, tropical islanders, tundra dwellers; inhabitants of hot deserts and of equatorial forests) to illustrate by means of definite instances the influence of the natural surroundings upon the distribution and life of man; (*b*) of more highly developed communities, such as our own, to show how far man has been able to utilize the natural resources around him, to illustrate the development of agriculture, mining, manufacture and commerce, and to bring out the interdependence and intercourse of different regions and countries.

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## CHAPTER II

# Infant and Junior Classes

In discussing the place of geography in the school the stages may conveniently be divided into three: (*a*) the lowest or the infant school stage; (*b*) the period ranging from children in Standards I and II, i.e. of the age of 7 to 9 years, to the top classes of the junior school at the age of 11 years; (*c*) the post-eleven years period.

**Infant School.**—Here at once the question arises: how far can geography be regarded as a proper " subject " for the child of 5 to 7½ years? In the strict sense it cannot. But geographical facts and even relationships may play an important part. Dr. Unstead describes its functions here as the discovery of any relationships between the world of things and the life of man. So geographical conceptions will always crop up in talks or in general courses on the simple facts of the environment. How and when these appear will depend upon the teacher and the life of the school and home. Two allies may be called into service. The first is that of wonder. Children delight in the mysterious, in events appertaining to day and night, to the sight of the moon by day or the stars by night, to the ever-changing shape and silent movement of the clouds. Nor does this element of wonder cease when we pass from the infant to the junior stage, and here the teacher would do no harm in breaking away from tradition. The second is what Dr. Unstead calls " far-off-ness ". " Once upon a time " is replaced by " far, far away ". This latter has to be used carefully, for the child dislikes vagueness and clings to the concrete. But as he rightly points out, the

town child may link this with the great variety of goods seen in the shop window or with the occasional sight of foreigners clad in native costume.

Modelling in clay or plasticine is obviously of great value at this stage, not that exactness of interpretation is needed, but it does help to show what interpretation the young mind is placing upon the descriptions and word pictures placed before it. Simple scenes may also be represented either individually or by groups of children. They give clarity to new ideas and serve as background for future knowledge.

**Junior School.**—It is probable that many junior schools will decide to omit geography and history as separate subjects from the time-tables of children up to the age of 9 years. Indeed, if proper time and attention were given to English and nature study, no serious harm would result if the subject found no formal place in the curriculum of the junior school. The English lesson will provide many opportunities for dealing with places and peoples. Story-telling plays an increasing rôle in the schools, and this deals with the thoughts and actions of children and of men and women under various climatic conditions both past and present.

To go beyond, at this early stage, is to invite the danger of mere formal memory work. It is true that at this stage children learn mechanically and easily, and to help this a world map should be introduced and used to fix the places mentioned in the stories. Many teachers indeed (at the lower junior stage) introduce the globe alone, with its distribution of continents. Better probably is it that map and globe should be used judiciously together.

The suggestion to omit geography from the time-table of the lower junior school is not new; it was recommended in the school code of thirty to forty years ago. The tendency, however, to begin the main subjects at the bottom of a school is difficult to change, and few schools have been bold enough to follow the suggestion. Happily, few teachers to-day follow the plan laid down by the code of the past, which decreed that the method of developing geographical ideas should be the outgrowth from the classroom and school to the playground and its vicinity, the village and the surrounding district, and lastly the county and country. As the *Suggestions for Teachers* point out, " it is hardly possible to draw sufficient material from so limited a field for the illustration of geographical ideas in a form suitable for young children ". Opinions as to what should form the content of a suitable syllabus are divided. Some teachers lay emphasis upon the approach through nature study and elementary science. Others follow the method recommended by the *Suggestions*, what Brooks has called the " story way ". Many teachers also make much use of models and drawing, either as one of the principal forms of approach or as a useful help to the other two.

**Scheme of Work.**—We give below in detail an interesting experimental scheme suitable for children of 7 to 9 years, to illustrate the variety of treatment which at this stage is so necessary.[1]

[1] This scheme was developed at the practising school of Goldsmith's College, South-east London, and is described by Miss Brown Smith and Miss Forsaith.

*General Purpose.*—To collect all material within the children's immediate experience, to work from that out towards their own country in the first case, and from thence to other countries. The beginning will depend on the actual neighbourhood, whether town or country; the nature of local industries, products, means of transit. The two sides of the environment should invariably be noticed: (*a*) what may be termed the purely natural side, i.e. the weather, wind, sun, the features of the country, e.g. rivers; and (*b*) the more social side, i.e. the shops, farms, industries.

*Standard I*

*The Natural Environment.*—Keeping of a nature calendar and records of winds, temperature, position of the sun: the children should measure the shadows in the playground about once a fortnight; they should notice in an open vessel the amount of rain that falls in a week, neglecting the result of evaporation at this stage; they should learn the points of the compass and how to read a wind vane. They should take excursions and record experiences; in this connexion they might begin to make maps of e.g. a park or the school garden, and to illustrate their descriptions. The ideas underlying the water cycle and the scale of a map should be introduced. This is daily work, and some part of it should be regularly done. Now and then a lesson should be taken gathering up these records and making inferences from them.

*The Social Environment.*—Supposing the school to be in a suburb or a provincial town, a lesson should be given once or twice a week, outlining the sources of the necessities of life, and leading to a study of the various shops. In Standard I the home-grown commodities only will be considered in detail, while in Standard II those of foreign origin will be taken.

1. *The Fishmonger.*—Fish from around the coast—the coast line—harbours, bays, capes, islands. A lighthouse—means of transit—curing of fish.
2. *The Greengrocer.*—Division of produce into home-grown and foreign. A fruit farm, orchard, market garden, and wild fruit sources. Covent Garden. Jam factories.
3. *The Dairy.*—Milk, butter, eggs, cheese. The dairy farm—pastoral districts of British Isles; means of transit. Roads and railway lines.
4. *The Draper.*—Wool, linen, cotton, silk. A sheep farm—hill districts. Woollen factories. Flax-growing—making of linen. Manufacturing districts.
5. *The Ironmonger.*—Coal and iron mining; a coal-pit—coal and iron districts. Further consideration of roads, rivers, railway lines, canals.
6. *The Timber Merchant.*—Kinds of wood, e.g. deal, oak, walnut, &c.
7. *A China Shop.*—Pottery. The Black Country. Cornwall.
8. *The Grocer.*—Flour, oatmeal, barley, soap, tea, sugar, &c. A flour mill—a grain farm—grain-growing districts of Great Britain—transit.

If the children have made plans in connexion with their excursions and immediate surroundings, they will be ready for a model of the British Isles.

*Standard II*

In Standard II, records of natural surroundings should be continued in more detail and a little more accurately.

The social surroundings will now lead from the foreign commodities found in shops of the neighbourhood to the children of other lands, where those things grow or are made. The order is from the tropical regions north and south to the cold regions.

*The Congo Forest*—ginger, nuts, bananas, pine-apples, palm, products.
*The East Indies*—rubber, spices, sugar.
*China and Japan*—tea, silk, rice.
*India*—tea, rice, gold and silver work, embroideries.
*The Nile Valley and Desert*—dates and cotton.
*Italy, Spain*—grapes, figs, oranges, olives, mulberries, flowers.
*Switzerland*—milk, wood-carving.
*Russia*—grain, tobacco, and sugar-beet.
*Kirghiz and the Steppes*—carpets, shawls.
*Canada*—timber, grain, apples, furs.
*Argentine and United States*—Red Indian products, wheat, and meat.
*Australia*—sheep-farming.

*Norway and Sweden*—timber, matches.

*Arctic regions*—oil, reindeer skin, whalebone, cod-liver oil.

In studying these, and in tracing the routes, the children will be introduced to the globe and thence to the great land and water masses, the phenomena of day and night as applied to the globe.

The success of any scheme depends, as is to be expected, upon the teacher. Normally, every child should acquire a varied background of pictures illustrating the different ways in which man is affected by natural laws, and his manner of accommodating himself to them. Modelling in sand, or better still in clay or plasticine—for example, of the characteristics of a mountain range, a coastline, or the course of a river in its different stages—will also help to develop clear-cut ideas of forms and relief. Exactness of reproduction need not be emphasized: capes and bays have characteristic features, and as long as these are clearly grasped the aim is achieved, for it is far easier to reveal the differences concretely than to find words which accurately describe them. At the same time the pupils may be introduced to more accurate conceptions by such exercises as drawing a pencil round an object, drawing an object in actual size and then to scale, or by measuring distances with rule, tape measure, or by stepping.

Modelling has tended to lose its popularity. The material is often dirty to handle, it requires time to prepare and space to keep the objects when done. On the other hand, some work of this kind is very necessary, especially with the slower type of child. One teacher of experience has recommended that the first approach should come through a discussion of the natural features of the neighbourhood. Then a model should be made of the school and its immediate surroundings, using, generally, different materials, e.g. sand for high ground, powdered blue chalk for streams, wooden laths or match sticks for railways, and soap blocks for buildings. When models of this sort have given clear ideas of the natural features, the children should proceed to make a plan of the whole district with line plans showing their routes to school. These done, picture plans of the district should be prepared, leading to similar plans of the surrounding areas. Finally a map of the area should be introduced and compared with the plans and models made by the children.

Often the teacher, aided by a group of children, may make a model before the class. Some writers object that many models are unreal, failing both in regard to accuracy of scale and in the representation of actual features brought about by natural agents. This holds only if the work is carried too far beyond the stage when the child has grasped the main principles on which the model is based. This is true for all stages. The use of such models will naturally decline as the children ascend the school, when the map will convey to the child the main physical or other features of the country.

Most of the schemes to which we have previously referred emphasize the necessity of forming clear notions about those natural phenomena

observable by all. Single lessons might be given at the ages of 7 to 8 years on the sun and its path across the sky to show the roundness of the sun, its midway position, how the south and other parts of the compass are fixed. Day and night could be treated in the same simple way, not perhaps in a sequence of formal lessons, but incidentally and with the idea of maintaining a continuous line of simple astronomical knowledge in relation to geography. For these lessons the globe would be in constant use. The Board of Education, many years ago, considered this side of geographical work so important that they planned a series of lessons consisting of thirty for each year. We give below a typical list of such lessons arranged for all four age groups of the junior school.

*Standards I and II*

A fine day. The sun and its daily course.
A spring day.
A summer day.
An autumn day.
A winter day.
The four seasons compared: temperature, length of daylight, position of sun at noon, shadows.
The sky in the daytime, clouds, apparent movements of sun, noon.
The sky at night: moon and its changes; great bear, pole star.
How we find our position: sun at noon, pole star, compass, points of compass.
A walk round the district: hills, valleys, streams; direction of principal places.
A neighbouring hill: base, slope, summit, peak or crest, waterflow, waterbed, &c.
Mountains: chains or groups, passes (model in clay).
Point out some on map of England.
A very high mountain: snow-line, glaciers, avalanches. (Pictures. Map of Europe.)
A volcano (picture). Construct one by throwing sawdust up through a hole.
Heating a flask of water. Boiling-point, 100° C.
Steam, clouds, rain.
A wet day: what becomes of the rain?
Streams and rivers: an imaginary walk or row down a stream, explaining terms.
Examples from map of England.
What rivers do. Drain, wash away land, supply water, serve for navigation.
Form river bars and deltas.
A busy seaport: lighthouses, ships, harbour, piers, docks, railway, &c.
Snowflakes and snow: shape of crystals.
A piece of ice: freezing-point, 0° C. Lightness, expansion on freezing.
Pebbles from a sea beach. The sea coast, tides, cliffs, &c.
The seaside; bays, islands, capes, &c.
A glass of sea-water; sea-water and river-water compared.
Plans of school and district; meaning of scale.
A map of the world; land and water.
Five continents, five oceans.
A sphere; compare with circle, cube, cylinder.
The globe. Poles. Equator. Tropics. Circles. Zones.
The Eskimos and the Arctic region.
Ice fields and floes. Icebergs. Whale. Walrus.
White bear, &c.
Reindeer.
The negro and equatorial regions.
The five continents: animals and plants.

*Standards III and IV*

In Standards III and IV the series of lessons should be continued, but should

include more lessons of a scientific character, treating of those chemical and physical facts bearing more directly upon geographical teaching.

How a poker is heated, how water and air are heated, how a room is heated, obvious effects of heat upon bodies.
Burn, melt, volatilize or evaporate, make red hot, boil, &c.
Boil water and alcohol: boiling-point of each. Boil alcohol in water.
Expansion of air, water, and mercury by heat.
Rate of heating and cooling of water, mercury, brick, compared.
Measuring heat: why mercury is used and not water.
How the sun heats the earth and air. Equatorial, temperate, and arctic regions.
Draughts and winds; land and sea breezes. Trade and return trade winds.
Equatorial and tropical calms.
Wind diagram.
Prevalent winds in Britain. West and south-west. Results therefrom.
A piece of chalk; microscopical structure. History.
Action of acid on chalk; chalk gas as carbonic acid gas.
Carbonic acid gas in breath and in air, water: freezing-point and boiling-point. Greatest density.
Water as a solvent: salt and carbonate of lime. Saturation point
Evaporating solution to dryness. Crystals. Distillation.
A bottle of soda water; action of $CO_2$ in water.
Presence of gases in ordinary water.
Oxygen gas.
Hydrogen gas.
Chemical composition of water.
Chemical composition of air.
Action of plants and animals on air.
Evaporation of water: what happens to vapour.
Clouds and rain: shapes of clouds.
The snow line: isothermal lines.
How mountains lose their snow: glaciers, moraines, avalanches.
What happens to rainwater (*a*) in descending, (*b*) afterwards.
Rocks: pervious and impervious. Sand and clay.
Surface springs.
Mineral springs and geysers.
Spring, river, and sea water compared with distilled water.
Night and fall of dew.
Height of atmosphere: air pressure.
The barometer; force and direction of wind, gradients, isobars.
Will it rain? The weather glass.
Rainfall. How measured. Rain gauge.
Mean annual rainfall in different parts of Britain.
Denudation: rivers—chemical and mechanical; frost and glaciers; the sea; sediment, where deposited; limestone, how removed. Inland seas—low lakes.
How rocks are formed; shale, sandstone, ooze, chalk, limestone, marble, peat and coal, granite.

It is not without interest to note that when the *Suggestions on the Teaching of Geography* were first prepared, the time and attention given to physical geography in the lower classes were quite out of proportion to those given to human geography. In that document stress was therefore laid upon human geography, and especially upon stories about children of other lands. So to-day, as Brooks puts it,[1] " Children get such an overdose of this teaching that in many instances they are bored and lose interest ". There is no doubt that in many schools the stories are too few and are repeated too often without sufficient variation. Often also

[1] Brooks, *Geography*, XV, p. 235.

the geographical pill is entirely lost in the attractive personal wrappings of the tale. The *Suggestions* give various forms by which this monotony may be avoided.

Variety of treatment is, of course, all-important. Many lines of approach have been suggested, but the teacher must choose those which attract him most. Thirty years ago inquisitive Tommy endured a coasting trip or a railway journey with an encyclopædic uncle, and the Geographical Reader teemed with the persistent questioning of the one and the patient, wordy explanations of the other. This and the " ad hoc Reader " have fortunately sunk into disfavour. Even *Swiss Family Robinson* is said now to have lost its appeal. Nor should it be taken for granted that the use of pictures or of concrete objects, often laboriously collected, gives clear and concise ideas, though they may introduce an appearance of freshness and reality. Young children and many adults fail to recognize photographs of often familiar places. Much care and thought are needed both in the choice and handling of illustrations. The child must be assisted to look for the features which it is the purpose of the picture to illustrate. The child, like the adult, sees what it is trained to see.

**Upper Stage. Junior School.**—The courses of instruction in common use in the schools differ only in detail. They comprise usually (*a*) local studies and elementary science with a bearing upon geographical principles, (*b*) the world as a whole treated very generally, the British Isles being dealt with in greater detail, but only from the descriptive point of view. Reference should be made to the schemes given earlier. The subject-matter which is thought suitable for this age both as regards the British Isles and the world as a whole is well known. We confine ourselves therefore to methods of development and of actual instruction.

Mr. Walsh[1] criticizes severely the teaching of geography at this stage. He holds that in the majority of schools there is far too little recapitulation and repetition, hence children are vague and confined in their knowledge about regions. He presses for much greater variety in treatment, e.g. greater use of imaginary railway journeys over the main lines in the British Isles, of journeys overseas in connexion with British trade. These involve, he claims, appropriate revision and the piecing together of lessons, they send the class persistently to maps and atlases, and they provide abundant material for exercises which the children can do themselves, as well as ample opportunity for a training in drawing correct inferences.

Even if we do not accept all his criticism, we may, however, agree with the aim he seeks, viz. that children shall proceed to the concluding stage (commencing at eleven) (i) with a working knowledge of the geography of the British Isles, and of the major natural regions of the world, (ii) thoroughly familiar with the map of the world, and (iii) able to use with intelligence maps coloured to show the varying height of land.

On the subject of local studies little need be said. Children at this stage are older and more capable of taking journeys of some length.

[1] Walsh, *Geography*, XV, p. 391.

Schools situated in rural districts and on the outskirts of towns should organize frequent visits to obtain closer acquaintance with the various features and to widen the scope of their studies. Nor need every visit be expected to produce fresh material. Of prime importance is the fact that the children are working in contact with reality. Schools in towns find school journeys during term time more difficult to arrange, partly through cost and, in part, owing to the stress of street traffic. But even in such cases a teacher who knows his district intimately can encourage his pupils to look for characteristic features or illustrations of selected principles and will use these in his lessons. The selection of facts set out for this stage is based upon the same principles as those which govern the list of object lessons.[1] Ground is covered a second time, but from a new point of view: more detail is now filled in: explanations even if still incomplete are carried farther. On the other hand some teachers are content to omit special lessons with a geographical bias about the school region on the ground that the world study gives ample opportunity for teaching facts as they appear in their natural places, that only such as are important and outstanding need be emphasized, and that the contrast between one area and another should be brought out as clearly as possible.

In dealing with the world, teachers sometimes lay emphasis upon the "build" of each continent, e.g. the mountain systems, the drainage areas, the character of the coast line. Others prefer to begin with the climatic zones and the modifications which local conditions introduce.

The British Isles are treated in many different ways. It is usually recommended that economic geography be postponed entirely until a later stage. It is doubtful, however, if this can be satisfactorily carried out in practice. Treatment by counties is no longer favoured, and the development outwards from the home region is rarely adopted. It is quite possible to divide up the country into large divisions, each with certain dominant features of land form and occupation. But occupations, whether upon the coal-field or in the shipping areas, seem to bring us back to economic considerations. All that can be recommended here is that the treatment be general.

Many teachers continue the practice of model-making. The use of models is desirable so long as it does not take up too much time in preparation. The child at this stage cannot read into a map all that is done by a trained adult. Given time he will work out details, but the quick comprehension of the physical features as a whole is important, and a model, even if not to scale, is helpful in this. The model cannot do everything, and when it has served its purpose in bringing home the relief the map should take its place.

Other teachers hold that children should be introduced to contours at this stage since the coloured maps of atlases in common use are constructed on that principle. One method used with success was to model

[1] See p. 74.

an island with hills, showing a number of the ordinary features, valleys, and hill spurs, steep and gentle slopes, inlets and shelving coasts, the surface at least being of modelling clay or plasticine. Then the model was placed in a glass tank and contours pricked out at levels formed by adding more water. Ultimately when the contours had been emphasized a photograph was taken from above or a drawing made and multiplied, making it possible to discuss details of a map with this model.

Other teachers approach the subject of contours directly. After all, there is little to teach beyond the meanings of lines near together and far apart, how to distinguish by the numbered contours V's which point up the valleys from hill spurs, and to note the running together of contours on a vertical cliff. Once children have the key they will play about a simplified contoured map with the numbers very clearly shown, making imaginary journeys when they reach the summit of the ridge or the bottom of the valley, determining where exactly the streams should run and where a ridge could be crossed with greatest ease. We have seen this method applied with great success.

Of late years it has not been the practice at this stage to make use of the globe to press home knowledge of the world. It is, however, essential that the globe should be used at least to ensure that wrong conceptions of the orographical world map are not formed. The introduction of projections at this stage is premature, but the children should gradually be led to realize that the map is but the skin of the globe. There is no reason why they should not copy from the blackboard bold sketch maps of interesting districts, though this mode of procedure should not be pressed too far. If a school can afford them, physical maps of the British Isles and of the various continents should be available for use when required. Again, a simple atlas, preferably showing altitudes by colour, and containing both physical and political maps of the world, the British Isles, the continents, and a few of the leading countries ought to be provided for class usage.

Occasionally much time is devoted to the drawing of accurate outline maps. But it is possible to waste a great deal of time in this way. Children must learn the broad principles of map-making in order to interpret a map, but interpretation is a very different thing to reproduction. There is no reason why a child should not understand scale and use it to determine approximate distances of a railway journey or the distance from port to port, but a plan of the school playground to scale is not advisable for young children any more than the memorization of coastline or county boundary. Children fortunately do somehow memorize many details, and many can reproduce with fair accuracy an outline map of Britain or the Americas. But that is no reason why teachers should make such exact drawings into class exercises. As maps on different projections are introduced according to the purpose in mind, so does the task of reproducing exact outlines become increasingly difficult.

One of the great difficulties a teacher has to face is an understanding

of the annual movement north and south of the major wind systems and their effects upon distribution of rainfall. More than one mechanical device has been tried to make this clear, e.g. a framework with bars to represent the doldrums and high-pressure belts, with arrows to show directions of winds. Others get rid of the bar by using a transparent gauge which is practically invisible, with coloured bands which show up the areas concerned.

World climate can be taught from the concrete by seizing such opportunities as our variable climate offers; e.g. a long summer drought can be used to illustrate a Mediterranean climate; desert conditions from a series of very cold nights in early summer with cloudless, hot days; the break-up of a long period of warm dry weather by thunderstorms with torrential rain such as the plateau of East Africa experiences. Monsoonal rains can be illustrated if we wait long enough for a really wet summer; equatorial climate by the occasional weather conditions which give us two flowering seasons and two fruitings for the same trees in one season. Many teachers, however, will probably feel that they cannot break the normal succession of their lessons for this. But they should lose no opportunity for such valuable incidental teaching.

The collection and study of objects and pictures, whether photographs, picture postcards, stereoscopic views, or cinema films (referred to before), should continue and more should be expected in the way of explanation. More attention will be given to accuracy of description, though only the outstanding physical features should be chosen. It is not the understanding of the evolution of land forms and of human settlement which is sought at this stage, but the appreciation of things as they are. The child should practise description in words as well as by simple sketch maps and drawings, and in this task picture and map can well go hand in hand.

Accuracy should be sought also in memorized knowledge about essentials. These a child can usually commit to memory with ease. Let the facts be well chosen and connected with one another sufficiently closely to facilitate easy recall. This is probably one of the most important of the tasks to be done at this stage.

## CHAPTER III

# Post-eleven Stage

The *Suggestions for Teachers* (1905) were written when the majority of children left school at the age of fourteen years, and when, owing to retarded promotion, a goodly number stayed for two years or less in classes which, for the most part, consisted of children who were aged eleven years and over. It is difficult to foresee the general line of future

development, but it is likely that for a season many schools will continue as heretofore, except that a clear line of demarcation within the school itself will be drawn at or about the age of eleven years. For such schools the *Suggestions for Teachers* (1921) indicate sufficiently the broad lines of treatment. With schools organized on the new basis, new problems arise. Firstly, the typical senior or modern school will have two or three divisions to each class; secondly, it may be assumed that at least the majority of the staff will be specialists; and thirdly, all the pupils will stay for at least three and some for four years. Certain questions at once suggest themselves. Are, for example, separate schemes to be prepared for the three levels of capacity, or will it suffice to provide one scheme for the same age group, the details being adjusted to furnish more difficult problems for the brighter pupils? As specialist teachers will be available, the compromises of the past will not be so necessary, and though the *Suggestions* have indicated the possibility of devising schemes to meet the limited interests of the class teacher, yet the future specialist will be expected to take comprehensive views of his subject and to have time at his disposal to do it justice. The longer period spent by the pupil at school will also give scope for wider treatment. With a course lasting four or five years, development can be shown and each major region can be adequately covered. It should be remembered that the secondary school usually prepares pupils for the First Schools Examination in four years.

### The Small School

In the past the main difficulty of the small school has lain in the fact that the classes for the children of eleven years were so small as to warrant the use of one teacher only. When this happened it was usual to take one scheme for all standards from Standard V upwards, or at best the four groups were divided into upper and lower classes. In such cases alternate syllabuses were adopted consisting of the study of one or two continents in one year, followed by the other group of continents in the second year. If an upper class existed, it studied the British Dominions alternately with the British Isles and their trade.

Provided care be taken in the choice of the continents there is nothing fundamentally wrong in this plan. Thus the Americas with Australia or Europe for one year, followed by the remaining continents in the second, gives the opportunity for the study of regions with definite belts on either side of the equator, followed by a study in the same year of geographical conditions in which man is both densely crowded and of dominant influence, since nature has been largely brought into subjection.

To meet such circumstances the books used by the pupils should be sufficient in number and quality and up to date in information. The atlases should contain plenty of maps for the separate study of important countries and geographical regions and for individual work by the pupils. Larger books of reference should also be at hand. The teacher should

" teach " often enough to give summaries of the knowledge acquired by study and to set the class searching for fresh illustrations of geographical truths. Apart from this the instruction will be on lines similar to those in the larger schools.

### The Central or Modern School

In the reorganized schools it is possible that there may be three well-marked age groups, or again the numbers may only warrant two. The classification will therefore differ from school to school. In a number of towns classification by capacity has been looked at askance: a class, which through numbers must be divided, is organized so as to contain representatives of the various types of intellect. This plan seems destined to continue in places. Plainly one scheme will serve for both groups and the pace must be regulated to the average child of the class. In other cases the supernormal children will be so few that they must be grouped with the better end of the average group, while the second stream is made up of the subnormal children with some of average ability. In such cases some difference in scheme, treatment, and rate of advance is possible. Rarely will it be found that clean-cut lines of division exist. In certain areas the proportion of subnormal children will be high, and for them a separate scheme in geography may be advisable. But general opinion seems to favour one scheme for the same age group with a fuller treatment where capacity permits. Various ways of solving the problem by increased attention to individual work are given later. The aim of the course will not be changed from what is set out in the *Suggestions*. An attempt should be made to study the world in orderly fashion, bringing out the effect of geographical factors upon human existence, and to pay particular attention to the Home Country. But the method by which this is attained will differ for various reasons. For one thing it will be affected by the probable length of school life, which in some schools is likely to be three years for the majority with a small percentage of children staying for four years: in others the proportion staying four years or more will be high.

It is difficult without undue hurry to make a proper survey of the world in three years, and, as the schemes show, there is a feeling that the British dominions should receive much more attention than other regions.[1] For this reason, as well as because of the different capacity of the pupils, the usual syllabuses adopted by schools which prepare for the First Schools Examination are not entirely suited to senior or modern schools.

Even in the selective central school without any distinctive bias a difference will often exist. The following abstract is taken from a suggestive paper by Mr. A. H. Russell, headmaster of a school of this type in Bristol.[2]

FIRST YEAR.—General view of the globe. Map reading: orographic, climatic, and vegetation maps. Natural regions. Tropical forests, grasslands,

[1] The *Suggestions* are strongly in favour of this line of treatment.
[2] Russell, " A Central School Geography Course ", *Geography Teacher*, XIV, p. 332.

deserts, Mediterranean lands, steppes and prairies, forests of the temperate regions, tundra. Weather observations and instruments used. Graphs of local weather. Graphs for typical climatic regions. Rainfall and vegetation diagrams. Position on globe. Direction. Latitude and longitude. Rotation. Time. Revolution. The seasons. Regional. Africa, South America, and Australia, treated generally and with special reference to the above.

SECOND YEAR.—Direction. Position. Plans and maps. Simple surveys. Scales. Latitude, longitude, and time: how determined. Climate study continued. Conditions determining isotherms, winds, planetary, seasonal, local.

THIRD YEAR.—Land forms—highlands, uplands, and lowlands. Land sculpture. Forest, grasslands, and deserts with reference to occupation. Fishing, agriculture, mining. Manufactures and transport. Regions treated simply. Asia and North America. Simple geological notions together with excursions, tides, and currents. Europe, commencing with sketch maps.

FOURTH YEAR.—During the fourth year some of the boys do quite a fair amount of surveying as their mathematics and practical drawing are sufficiently advanced. The subjects for this year are: Simple occupations in new countries. Agricultural products. Mining. Manufactures. Commerce and transport. People of the world and their modes of life. Ordnance survey maps. Surveys. Contours, sections. Region studied—the British Isles.

**Concentric Method.**—Twenty years ago the " concentric plan " was favoured both in secondary schools and in some advanced elementary schools. The world as a whole would be studied in the first year, but superficially only. It was thought that important details could be filled in during the second year, using the framework already constructed: during the third year the study could be completed by a thorough examination of the causes for different geographical phenomena. The plan has lost its hold. For one reason, children do not seem interested in such an approach. They prefer to go rather more deeply into details of a smaller region and to pass in the next year to a region of different type. Somehow it is easy to visualize a continent, and thus a child is helped to realize topography and to memorize important details. It is difficult, moreover, to omit all treatment of rational geography concerned with climate, map projection and the like until the child's studies of science and mathematics make explanation easy. All one can claim is that explanations of such points be taught dogmatically or by analogy as they arise, and that a teacher should choose his opportunity when a real explanation seems suitable; e.g. the effect of seasonal winds can be treated very well when India is under study: conditions of wheat-growing when Canada is the area concerned: recovery of semi-desert lands for agriculture purposes when Australia or the western states of America are to the front.

The old plan of studying Europe and America in the first year, North America and Australia in the second, the rest of the world in the third, and the British Isles in the fourth has few supporters to-day. As long as the mere memorizing of facts was held to be of the first importance there

was some justification for taking Europe in the early stages. But the difficulties in understanding its climate and its complex political problems have caused many to favour postponement. Many teachers of to-day adopt the plan of starting with the Americas or Africa, followed by the other continents before reaching Europe and Asia; others take (1) the two Americas, (2) Africa and Australia, (3) Europe and Asia, (4) the British Isles and British Dominions. Professor Roxby [1] has suggested an outline scheme covering the four years from ten onwards. The preliminary stage is to be rounded off by a descriptive treatment of the British Isles. Next comes physical geography covering two years. Movements of the earth, the seasons. Day and night. Distribution of land and water. Configuration of the continents. Land forms and agents modifying them. Wind belts. Broad distribution of temperature and rainfall. Climatic regions. Vegetation in relation to climate. Human geography. Continents in this order: South America, Africa, Australia, Asia, Europe, or North America.

Lines of treatment in the case of each continent are:

1. General descriptions of physical conditions and vegetation: chief natural divisions.
2. Each great vegetation zone as a unit.
   (*a*) Descriptions of natural features and climate.
   (*b*) Products, natural and cultivated, in relation to physical conditions.
   (*c*) Communications with outside world and internal means of transport.
3. Distribution of states in relation to natural regions.

The last year is devoted to North America, Europe, or British Dominions. Interchange of products and tariffs: transport: unearned increment: bounties and trade.

**The Detailed Syllabus.**—It is impossible to determine what should be the best order. Of importance is it that the teacher should be clear as to (i) what he is seeking to achieve; (ii) at what stage he will introduce explanations of fresh important geographical data which can be illustrated from the areas under treatment; (iii) how he can make the study progressive throughout. It is for this reason that most writers of geography textbooks put the Americas first. These continents permit of a comparison of regions on either side of the equator and of a study of problems which concern the geographical consequences of civilized peoples replacing the less civilized.

Brooks [2] lays down that the teacher must ever keep in mind three points: the possibilities of the locality, the characteristics, needs, and outlook of the people, the nature, requirements and outlook of their work,

[1] Roxby, *Geography*, XI, p. 163. [2] Brooks, *Geography*, XV, p. 139.

illustrating what he means by the terms of Professor Geddes, " Place, Folk, Work ". Lessons must be fitted to the age and capacity of the pupil, but these principles should always be kept in mind.

An example of a scheme novel in its conception and influenced by the work of Professor Geddes is that adopted in a Dumfries school. The scheme is planned for pupils not passing into secondary schools who stay for three years.

*Year 1.*—Cradle of the British peoples. Dumfries basin. Scotland. Britain and her seas.

*Year 2.*—Home of European peoples. Measuring of Europe. Southern slope. Northern slope.

*Year 3.*—Sphere of human endeavour. Lands of the Old World. America. Southern lands and seas.

The scheme is intended to give children an outlook which will help them to be intelligent citizens.

The justification for taking the British Dominions in the last year is based largely on ideas connected with civics and patriotism. It may be said to render possible a sound if elementary study of economics. It is true that every pupil should acquire some acquaintance with the influence of such problems as supply and demand. But too narrow a view as regards the British Dominions may interfere with a study of the economics appropriate to the age of the pupils. The empire is not entirely self-supporting. Britain, for example, still relies on other parts of the world for food and other articles—upon the Argentine for beef, the tropics and China for oils, the United States for raw cotton, upon Persia and Russia for petroleum. For some imports needed in this country quick transport by air or water is essential: we look to Spain for early potatoes and to the Mediterranean regions for flowers. A study of the Dominions must go hand in hand with a study of Britain and its needs. Even the most ardent protectionist does not suggest a detailed study of the Pacific Islands belonging to the Dominions or of the Falklands. The differences between Southern Canada and the adjacent parts of the States are too small to cause separation on the spot: the wheat lands include Manitoba and parts of Dakota and Minnesota, while the ranches abound both in South Alberta and parts of Kansas and Nebraska, and their trade is all one. It seems most convenient to put the trade of Britain to the front and to emphasize the Dominion aspect of that trade without exclusion of trade consideration elsewhere. After all a new aspect of the question is arising under the title of " The United States of Europe " which may affect our geography schemes greatly.

Every scheme should include both the physical aspect and something of historical and political geography: perhaps something of modelling.

The school need not attempt to turn every pupil into a walking gazetteer of information. " He must be content hereafter," [1] says Sir Oliver Lodge, " with the possession of an atlas which he may take pleasure in consulting, together with guide-books which are often the best treatise

[1] Lodge, *School Method and School Reform.*

on geography, and on the gradual opportunity afforded by travel for becoming acquainted not with the mere dry names of important and interesting places, but with their full-bodied life." If a child leaves school capable of doing this the school undoubtedly has done its duty.

It may be impossible to cover the world, but there should be no difficulty in dealing with portions of it as representative of the various types, e.g. an industrial region, Mediterranean lands, a region of tropical agriculture, a monsoon region (preferably India), a region of a temperate agriculture (the choice is a wide one), a desert region. But on this question it would be wrong to be dogmatic. A teacher of a senior school may feel that a bias towards commerce may serve as the mark of distinction between the scheme for super-normal children and the more generalized one to be adopted by others of the same age group.

**The Commercial Bias.**—In the selective central school of commercial bias the outlook can very well be reflected in the emphasis laid upon certain details and aspects of geography. Yet even in such schools teachers may prefer to follow the general scheme, reserving the special treatment for short intensive courses or special lessons given when the occasion arises. Of such schools much may be learnt from the experience of London. Up to the age of fourteen it has been shown that the most convenient practice is to adopt a non-specialized education.[1] Afterwards the bias (to quote an official phrasing) "should not take the form of an interpolation of unrelated subjects. It should affect the scheme as a whole. Geography is one which could be considerably affected by the bias of whichever side, industrial or commercial, is adopted."[2] In another school the aim towards a general education is maintained throughout, though with preparation for commercial occupations kept in a subordinate position. Following upon a course based upon a study of the major climatic regions it passes to world supplies of raw material: survey of trade routes and industrial centres: the rise and decay of early civilizations: the rise of nationalities in western Europe: the world as an economic unit: story of geographical discovery.

In some commercial schools much attention is given to lessons accompanied by the preparation and interpretation of statistics, such as are obtainable from Whitaker's Almanack, Board of Trade returns, publications of shipping firms, documents to be obtained gratis from the London offices of the various Dominions, from the periodic special numbers of the *Times*, and articles on imports and markets in other papers, such as the *Daily Telegraph*. Such statistical work follows quite naturally upon a course of general geography.

Some teachers dwell at the outset upon climatic conditions in detail, region by region, and in this connexion particular reference should be made to the excellent work being done on climatic data by Messrs. Cundall

[1] See *Report on the Education of the Adolescent*, pp. 112–21.

[2] The general lines of such a scheme adopted in a school are given in the section on Organization, Vol. I, p. 61.

and Thurston, published from time to time in *Geography*,[1] and supplying reliable data difficult to obtain. Another line of development may be (i) the classified products of the major geographical regions, e.g. of the grasslands, lands with hot summer rains, area by area, (ii) statistics of world productions of particular supplies such as tea, wheat, apples, cane- and beet-sugar, and the like. Or they may study (*a*) the import and export trade of countries in succession, (*b*) an area of production, the means of transport, and the ports connected, e.g. of wheat in Canada or the beef of South America.

Again, a special study may be made of the trade of a country, e.g. the British Isles, the sources of its supplies: minerals required and whence obtained: manufactures and their distribution: railways and other modes of transport in connexion with particular classes of goods: ports and their trade: shipping and especially the foreign ports whence the particular goods, e.g. timber, spices, or rubber, are obtained. Our fisheries and the fish trade. Our coal trade. The distribution of population in relation to trade and industries and special statistics relating to trade within the Dominions—and, if time permits, the more important countries like the United States, France, and Italy.

Or again a teacher may prefer to take a few important articles and develop a course upon their trades. The supply of different fruits to the British market throughout the year provides ample material for a very full course.

In other schools the statistical aspect is less to the front, but lessons are given which emphasize trade and the circumstances which favour or hinder it. Thus, such matters are dealt with as the features of the coast which bear upon navigation: harbours natural and artificial, capes as dangers to shipping, sandbanks, and the various modes adopted to warn sailors. The factors which determine the position and trade of great ports like Liverpool, Southampton, and Hull, and which give some small countries importance while large countries are often comparatively unimportant. The effect of its hinterland and means of transport upon a seaport: effect of quick transport upon interchange of goods—distribution of industries with relation to cheap coal and mechanical power and the securing of raw material—trade centres and trade routes.

Syllabuses vary greatly: they may be framed to suit local circumstances. Thus the trade of Glasgow or Bristol differs greatly from that of Hull, Cardiff, or London; that of Holland is in contrast to that of Switzerland.

Other schemes follow generally the accepted lines of the schools of commerce—beginning with an analysis of our requirements in life into things necessary and convenient, things making for comfort, luxuries, and passing on to the sources of supply and labour required for different categories of production, exchange, and manufacture: towns and markets and commercial centres: internal and external trade of a country: trans-

[1] See *Geography Teacher*, Vol. XIII *et seq.*

port: competition in trade: emigration and colonization: the great sea-ways: commercial studies of Great Britain—the natural trade divisions of the continents: statistics of production, imports and exports. There is no reason why such a scheme should not be successful, given that the geographical outlook is kept to the front, the treatment simple, and the interest of the class well maintained. Unfortunately, as Fairgrieve and Young [1] point out, the opinion of the outside world is in favour of the needs of business, and this may lead to the introduction of an excessive amount of detail and of memorization, both of which make for monotony and a loss of interest.

On commercial geography Messrs. Fairgrieve and Young [1] have given useful hints to teachers in north London which deserve wider attention. Like others, they hold that much of the so-called commercial geography is memory work, and that often the material to be handled is "a mass of loosely connected bits of information which are always changing". The similarity of treatment which is bound to occur in dealing with one commodity after another is also not calculated to maintain the interest of the pupils. The authors would choose certain commodities and present their study as problems, grading them as to difficulty, the whole course being designed to bring out the complexity of life on the globe. The selection of commodities might be based, they suggest, upon considerations such as the following:

1. The production of the raw material can be used to teach certain basic geographical facts.
2. The commodity is typical of a big region.
3. It brings out the effect of environment.
4. It is of world importance.
5. It gives a point of view whence we can review our knowledge of transport facilities, climatic factors, distribution of vegetation.
6. In dealing with production, transportation, manufacturing processes and marketing, it brings up for consideration habits, occupations, and interests of other peoples.
7. It lends itself readily and easily to teaching international interdependence and helps to break down our insular ideas.

As an illustration of the type of information which may well come within the purview of the geography teacher, a lecture on Empire Development [2] by the Honourable W. G. Ormsby Gore may be taken. He gives, for example, a comparison of the domestic exports in 1924 of British Malaya and British Guiana. These are roughly of the same size, in the same latitude, with identical rainfall, and both possessing a rich soil. Yet the former exported in money value sixty-eight and a half million pounds, British Guiana only three million. The value of exports per

[1] Fairgrieve and Young, *Geography*, X, p. 239.
[2] Ormsby Gore, *Geography*, XIII, p. 268.

unit of population placed British Malaya second only to New Zealand within our Commonwealth. The cause seems to be in its position as regards shipping, its excellent harbour, and the attraction of much capital.

Other figures were given in the same lecture, which, rightly used by the teacher, are likely to interest the pupils.

1. Less than 1 per cent of the area of the British Empire is in Europe, but more than 10 per cent of its population (121 thousand square miles, population 48 millions).
2. In North America with 3792 thousand square miles there is a population of only 11 millions.
3. In Australia with 3 million square miles a population of only 8 millions.
4. Africa has more space of the Empire than any other continent (4 million square miles: 56 millions of people).
5. The vast bulk of the Empire population is Asiatic, 2 million square miles with 336 millions of people. Yet the population of Asia is less dense than in Great Britain. Yet it is denser than in Africa owing to the ravages of disease. The returns for exports show that the European is a relatively high producer, though, under guidance, even the least progressive make rapid advance, e.g. the Gold Coast and Uganda.

An enterprising teacher will find many summaries of information which give freshness to the teaching of economic geography. Two other examples will suffice, the first from Baker [1] on India: "There is a good demand for improved varieties of wheat, rice, and sugar-cane, while cotton, jute, indigo, tobacco, oil seeds, rubber, coffee, tea, fruit, and fodder have all received attention. The rice crop occupies more than a quarter of the area under cultivation in India: she has a larger area under sugar-cane than any other country though her output is small: in jute she possesses practically a world monopoly: her cotton production is second only to America, although in yield, length of staple, and value her crops are not so important. Any great industrial development must be built upon an agricultural foundation."

Secondly, Visher [2] in a study of Holland brings out the probable causes of her important position:

1. First, its position on the North Sea where commerce is thick; the Rhine is an inland waterway; much of the commerce from Central Europe to the North Sea and from France to Germany must cross it.
2. Being level it readily develops modes of transportation and is favourable to agriculture in spite of soils varying much in richness.

[1] Baker, *Geography*, XII, p. 127. [2] Visher, *Geography*, XII, p. 441.

3. Absence of minerals has confined her people to agriculture and horticulture, in which she excels.
4. Climate is favourable to grazing because of its coolness and humidity. The poor drainage and frequent rainfall lead to extreme cleanliness, which makes for first-class dairying.
5. Being limited in possible exchange of goods she sought colonization and carrying sea trade, and has specialized in various industries arising out of that trade. She has seized all modes of enlarging her acreage, and has become expert in draining lands, in various developments such as banking (arising out of marked communal development).

Yet in spite of man's conquest of nature, Visher accepts the doctrine which Treitsche of Berlin advocated and expressed thus, " It is our natural destiny to absorb the Dutch into our Reich ". Holland, it appears, cannot stand alone in the future.

One subject which might be introduced more frequently into commercial geography is that of clock time in various parts of the world. The International Date Line, fixed in order to change the day, adding or dropping one according to the direction of sailing, follows the 180th meridian except for a few deviations to keep various islands of the same group within the same time system. Countries differ in the choice of meridian from which they take their time. England takes Greenwich, but Ireland takes Dublin: the United States for fixed standard time have five lines which are 5, 6, 7, and 8 hours respectively behind Greenwich: a number of European countries take Central European time which corresponds to Coney, 15° E., and so is one hour in front of Greenwich: others take 30° E., two hours in front of Greenwich. Thus standard time renders it easy to calculate time in different places. Unfortunately a number of countries have not accepted zone time as yet. The need for a complete agreement in order to avoid confusion in air, rail, and water communication is obvious.

**Political Geography.**—During the past quarter of a century attention has been directed away from political geography, but post-war problems have tended to bring the subject again into prominence. Such questions as international arrangements for shipping, harbour dues, regulations concerning emigration, passports, influence of bounties upon exports, market arrangements and storage of food products, direction and nature of trade, and postal systems require constant reference.

The boundaries of Germany now exclude much coal and mineral country which was formerly within it: its economic development is seriously disorganized thereby. The break-up of European Russia and of Austria-Hungary implies increased difficulties in trade questions and internal economy. The Balkan States indicate how nations and states may exist which have little relation to similarities of race, speech, or religion. So the questions of boundaries, natural and artificial, assume importance. Our own interests are affected in a consideration of the boundary of Canada

and Alaska as affecting the Yukon goldfield, and in relation to matters of prohibition and winter trade when dealing with the curious boundary between Canada and the States near the eastern coast. The political aspect of geography has a special concern for the British Dominions with their varying relations to countries like Egypt, Palestine, and even Ireland, and to the regions governed by virtue of a mandate.

The work of the League of Nations is calculated to focus attention upon particular points of geographical interest—such, for example, as the rearrangement of Central and Eastern Europe, with the growth of new states including people of various races; questions involved in the over-population of monsoon Asia while lands remain unoccupied in America and Australia; the fierce competition among the leading nations for fresh markets, especially in the thickly populated but undeveloped tropical lands; the struggle for the limited world supplies of various foods and raw materials; the reorganization of the British Empire in relation to trade and emigration. It is a new aspect of political geography about which a child should be taught something before he goes out into the world.

A reference to the outline scheme of Professor Roxby (p. 86) will show that the distribution of states in relation to natural regions forms an integral portion of the work. It should be possible to recover much ground which has been lost without pressing political geography too far. Let atlases be up to date and contain political as well as orographical maps of the more important countries, and let children make free use of them. They should know the names and positions of the more important countries, their leading towns and outstanding physical features, and for what they stand in the economic arrangements of the world. Statistics of trade and production should be used even if they change too rapidly for more than generalizations.

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CHAPTER IV

# The Rural School

The school with a rural bias ought not to differ much from other schools in the schemes and the teaching of geography. But without unduly affecting the general course of instruction it should be possible to concentrate more upon the facts of production than on those of commerce. On the one hand the problems which the agriculturist at home must face can be better understood by what the geography of other regions can teach; on the other, life in other portions of the Dominions will have less strangeness for the possible emigrant if the conditions have been rendered familiar to him when at school. Reference should be made to Rural Education in Vol. III.

Geography in the rural central school will be linked with other subjects such as natural history and gardening, which all reflect on the environment. An excellent example of what may be done has occurred in Northamptonshire. The Government Ordnance Survey has recently issued a map showing cropping conditions in the county based entirely upon observations made by children of the various village schools, who entered details upon 6-inch maps during their local surveys. These were afterwards reduced to a small scale for purposes of publication. Many English schools have made and kept, year by year, such maps for themselves in order to bring out the rotation of crops in vogue in the district.

Schools are growing accustomed to studies of farm conditions, the processes of cultivation and their association with particular soils. Without this it is difficult to pursue such a study of geography as is here advocated.

Whatever region of the globe is under treatment the productive side should be emphasized, and the crops and various processes of cultivation compared with what the children see in use about them. During the last two years of school life this aspect may well receive special attention. There is abundant material available in documents issued by various Dominion offices and in the reports by first-hand observers. The reports, for example, of expert advisers upon the agricultural possibilities of different portions of the Dominions give much detailed information on particular regions which are open to the would-be emigrant.

It is essential that schemes of this type should be based upon some knowledge of biology and agricultural practice at home. From a study of the homeland a course with an agricultural bias (including geography) can be developed. This should include a study of physical and climatic conditions, the response made thereto by vegetation, natural and artificial, and also by animals; modes of enriching soil for various purposes; rotation and succession of crops; scientific improvement of breeds.

The returns made annually to the Ministry of Agriculture and summarized by them show the usage to which land in various parts of this country is put; the Meteorological Office publishes a daily weather chart which is repeated in simplified form in most daily newspapers; market prices are readily obtainable from newspapers and other publications, and so are railway and other transport rates for vegetable and farm produce generally.

**Soil.**—One of the principal factors on which geographers depend is soil. But the whole idea of what soil is has changed in recent years. Formerly it was held that soil was a physical mixture of residues left by a breaking up of rock, either in situ or brought from elsewhere by water and other agencies, especially ice. The soil was expected to respond very largely to the character of the underlying rock. But soil chemists, especially in Russia, have established a set of entirely fresh conceptions and a new classification is finding general acceptance. This classification is based more upon climatic conditions and their results in preserving humus in the soil, in removing various salts entirely or

causing new compounds to be formed, some of which are less suited to plant use, or again in storing the useful salts in layers at some depth from the surface and ordinarily beyond the reach of the roots of plants.

The terms introduced by Glinka, the leading Russian authority, are appearing in the newer textbooks on geography, which should be consulted if details are required.

It will suffice to say here that soils depend largely for their fertility upon the presence of humus and of the various salts which assist plant growth. When rocks like granite disintegrate they set free various salts which are essential constituents of the component minerals, such as the salts of soda or potash, salts of alkaline earths like lime and magnesia, iron salts and silica. All gardeners know the importance of soda and potash salts for plant growth, the injurious effect of these salts when in excess, and their quick removal from soils by solution under rainy conditions The surface soils of arid regions in warmer portions of the globe contain much soda and potash salt because evaporation carries off the water which otherwise would convey the salts downwards. Wet tropical regions have red soils (called " laterites "), because constant percolation allows the soluble salts to be carried lower, while, concurrently, reactions are set up which help to get rid of the vegetable matter and silica as well, leaving the iron salts behind in excess. Less rainfall in the same regions may leave more of the alkaline earths behind along with the iron salts.

The famous " black earths " of South Russia and elsewhere are due to special conditions giving seasonal rains sufficient to remove the soluble salts present in the soil. These give rise to much vegetable growth which remains in the surface layer since the dry alternating season reduces the rate of decay. The " chestnut coloured " soils are near akin, being produced where the seasonal rainfall is less and hence the vegetation growth smaller. In more temperate regions where rain falls throughout the year the solvent action is constantly going on, and through the action on the iron salts of decomposing vegetable matter, which is constantly growing, portions of them are also carried away, thus giving rise to a brown instead of a red soil. This " podsol " soil is typical of our own country. These salts when carried lower often accumulate and bind together the particles in hard layers which plants cannot break through, hence the deep ploughing of some English districts.

Actual surveys of soil and of human relations dependent upon agriculture and so largely controlled by soils are being made in many parts of this country, and schools can certainly assist. The Northampton survey shows that children can make accurate observations of growing crops. It is equally assured that they can make simple soil surveys, not in the terminology of the geologist or the soil chemist, but according to a simple classification which can be worked out at school where specimens of the various types of soils are kept ready to hand for reference. A Cheshire school, adopting a scheme of this kind for its children of about fourteen, was able, without planning special school journeys, to work out a series

of observations as to " the influence of geology on shelter, food, clothing, and communication in the district ". The children found (*a*) that old houses near the Pennines were dependent for material upon Millstone Grit with shale for roofing; along certain strips where the rock outcrops, upon red sandstone with thatch or tiles for roofing. On the glacial sands and clays of the plain, half-timbered houses with cement fillings or rough-casting on the exterior (" wattle " and " daub " in local terminology) prevailed: but all are disappearing in face of modern brick made locally from the clays, with imported North Wales slate for the roofs. (*b*) Cheshire agriculture depended upon the demands of the Black Country and Lancashire for dairy products, eggs, fresh fruit, and vegetables. As a result the pupils found sheep on the poorer but well-drained hill pasture, cattle and horses on wet rich lowland pasture with pigs to use up the surplus, ploughed land for potatoes and fodder crops on glacial sands, and warm red soil and fruit-growing in protected areas where the climate was suitable.

**Geology and Geography.**—Authors writing on geography use geological terms freely. It is therefore important that these terms should be used with their exact meaning. Professor Stamp has advocated within recent years the revival of using specimens as an aid to the teaching of geography. Certain concrete aids are necessary and museums in schools usually contain such material but not in form available for use. It should not be difficult to teach children the outstanding characteristics of typical rocks, granite and basalt, limestone and chalk, grit and sandstone, clay and shale.

**Horticulture and Geography.**—Another aspect of the question comes to mind when gardening is considered. The child knows that certain crops stand the winter, that the first frost kills others, hence runner beans and marrows are not planted outside until the spring is well advanced. Some plants can only be grown under glass. Other plants grown under glass reach their fruiting stage earlier than when grown outside. Some potatoes, for example, are divisible into groups, early and late, according to the period required between planting and cropping. Various plants and weeds succeed better (1) in a wet or a dry season, (2) according to the colour and texture and chemical nature of the soil, and (3) the prevalent direction of the winds. Thus the child is brought naturally to see that (*a*) climate affects particular plants in different ways, and that detailed study must be made of the various elements which make up climate, (*b*) soil and its condition are important, and (*c*) that plants themselves need careful consideration in relation to environmental conditions.

**Agriculture and Geography.**—With such first-hand knowledge as gardening and visits to the local farm provide, a class can do much towards a real study of agriculture in all parts of the world, region by region. As an example of a regional study, Russell takes Britain as a whole and points out that while dry conditions favour grain production and wet conditions lean to grass, very light sandy or gravel soil and very heavy clay, even if dry, mean risks of failure, hence medium and heavy loams (clay with some

Drowned Valley—Gillon Creek, Cornwall

Drowned Valley—Milford Haven

LAND FORMS—I

sand and lime) are preferred. An old English saying is, " Drought never bred dearth ". But it led in old days to the custom of growing oats, rye, and beans, which were surer crops alongside wheat. Again, wet conditions meant that in olden times the well-to-do settled in drier districts, e.g. Cheshire and Shropshire, rather than in wet Wales. Clay parishes all tended to be large: very heavy clays meant woodland. Chalk with its short herbage is favourable to sheep, which run risks of parasite attacks when on the low well-watered ground. Arable country fed cattle only in winter. To-day specialization has set in, e.g. the Wash areas for particular types of potatoes and the Evesham district for fruit and vegetables.

There are many other practices which are worth noticing, e.g. the shifting of the cattle and sheep from the hills to the plains as winter approaches. This habit, often called " transhumance ", prevails on a large scale in Switzerland and in many parts of the Dominions. In Basutoland and, to a certain extent, in Natal, cattle and horses are sent up country as the hot weather approaches, while sheep may come down to lower heights in the cooler seasons.

**Climate.**—The study of climate is held by many to fall within the zone of science. Geography is, however, more concerned with its results than with its causes. Yet it is impossible to avoid giving children an explanation of phenomena, even if crude. Teachers who have a liking for such details will find a most helpful paper, with the knowledge summarized as 36 generalizations, written by Professor S. S. Visher in *Geography Teacher*, XI, p. 101. On the importance of a close study of local weather conditions, Miss Newbigin, one of the most eminent of living geography teachers, has warned us against too much reliance upon general weather forecasts and meteorological returns as indicating conditions under which certain plants will grow. She illustrates her point by reference to plants familiar in English gardens growing right through the Winnipeg winter with 35° of frost; the English cool, damp summer which has prevented many European plants from establishing themselves here; the milder climate of the south-west and south Ireland, which allows typical Mediterranean plants to grow, while typical plants of Greenland and Spitzbergen appear in the colder parts of Scotland.

**Rainfall and Irrigation.**—It is to questions of irrigation and rainfall and to the use of new varieties of plants that geographical study of other lands by the rural expert is chiefly directed. Rainfall in England is spread throughout the year, hence drainage is necessary to get rid of the excess. Irrigation, however, is needed in many regions outside Britain to supply sufficient moisture for cropping. Agriculture has learned much from the practices of the Mormons in Utah; California with its fruit-growing is dependent upon it. Egypt for centuries has used the Nile, and China its various rivers. Some details of practices in Egypt and Australia are given as illustrations. In Egypt 2420 million cubic metres of water are stored annually beyond the Assuan dam. About the end of November when the Nile has ceased to send down silt, the gates are closed and gradually

the surface rises until February. About April, the Nile has insufficient volume to supply the needs of Egypt, so the dam is gradually opened to make up the shortage. About the middle of February the sluice gates of the Delta barrage above Cairo are closed to turn all the waters along the three main canals from which the delta is irrigated, each tract receiving its supply in turn. In this district to-day five crops are produced in two years, whereas formerly only one was grown annually. Then the floods occurred naturally in August to October. Dykes ran along the river bank. When the flood was high enough, the water was allowed to inundate the plain. In six weeks the suspended silt sank and the land was soaked. Finally the surplus water was got rid of, the seed sown, and about April to May the harvest occurred, though occasionally watering from the river by means of a simple mechanical device was necessary. For the remainder of the year agricultural operations were suspended.

In Australia, within the basin of the Murray River—quite apart from the supply from artesian wells, which is used more for stock and scouring of wool—irrigation of land is being developed by pumping from the river of sand into reservoirs, whence water flows to the different farms. Sheep-land is thus converted into regions of fruit-trees, oranges and lemons, apricots and vines. The government is developing other areas by means of vast schemes of irrigation—immense storage tanks fed by diverted drainage—which in addition to grazing land provide settlers with a certain amount of land capable of cultivation.

**Changes due to Discoveries.**—Agriculturists look to the creation of fresh breeds of animals and plants to overcome the difficulties which climate and weather present in different places, and to improve the marketing advantages of certain regions through early cropping. For example, plant-breeding is producing varieties suitable to certain areas—broccoli to the climate of Cornwall, quick-ripening wheats to the short summer of Alberta. In central China and Japan there is a curious period when rain slackens in the middle of the summer monsoon, for which a special variety of rice has been evolved which ripens before the storms of the later period. A special bureau in the States is constantly introducing new varieties to meet differing conditions. Animal breeding has produced varieties of sheep and cattle which can resist disease, and renders seasonal migration in Africa less necessary. By crossing English cattle with the native breeds of humped cattle of South America a variety has been developed which produces good beef and can live under local conditions in spite of various pests. Methods and procedure in agriculture respond quickly to human influences. It is often said that an Englishman will take with him his environment wherever he goes. Dr. J. L. Myres has drawn some interesting pictures from his travels which show that what we call English conditions soon begin to develop when the English farmer settles in a new environment. He tells a story of an English settler in Rhodesia who writes that the African countryside with its partly timbered veldt is growing homelike in appearance after one season's

grazing of his cattle. Even in Ontario the old settlers were known by their preferences, since the Scot spared the pines and the English the oaks. Reclamation is a slow process, and farming under such conditions means a persistent fight with nature. No wonder that the Texas farmer with his wide grazing lands could say of England at the end of a week's visit: " All gardens; I ain't seen no country yet ". Nature also soon re-establishes herself. Even at home, when the Englishman neglects the zone under his control, she asserts herself, as the rapid encroachment of weeds and thistles, of wild rose, thorn, and elderberry upon vacant allotments, bears silent testimony. In subtropical regions a sugar-cane estate once abandoned is reconquered by the forest in a few years.

**Population Problems.**—One of the aspects of geography to which attention is often paid is density of population. Agricultural lands are rarely densely populated. We are familiar with the fact that areas in Britain show increased density as they become more industrial. To-day State policy is leading us to inquiries as to the proportion of the population which should be engaged in agriculture as a remunerative occupation without causing increased prices for food. Of course English trade and home-grown production of food are in some ways opposed, but conditions change so rapidly that we must prepare for the future. Professor Fawcett estimates that one-thirtieth of our total population engaged in agricultural work produces a half of our supply of principal food-stuffs; in other words one agriculturist can produce a food supply sufficient for fifteen persons. But this implies a further rural population of craftsmen and traders which increases the proportion dependent upon agriculture, so that five million people or 25 per cent of the inhabitants of Britain are engaged in supporting twenty millions—a proportion which improvements in agricultural practice and better strains of plants and animals may reduce. Statistics of population, however, are not very trustworthy, seeing that in new countries larger areas require less labour, while at home many town workers now live in rural districts, and traders concerned wholly with rural industries are town-dwellers. Still, the study of population maps in relation to agricultural industries is one which ought always to be included in the curriculum of a rural school. There are vast areas of the world waiting for agricultural betterment and calling for fresh settlers.

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## CHAPTER V

# Historical Geography

What is termed historical geography is scarcely suitable as the main element of the geography syllabus. It does, however, provide one aspect of the subject which has considerable attractions. It is common experience

that tales of original statements of the early explorers, the description of their voyages and discoveries, have a strong appeal for the average child, and books containing accounts of these discoveries and extracts from original sources are now available for class use.

It is not uncommon to begin a study of the New World or of a southern continent with a short series of lessons on the early explorers. Quotations from diaries or first-hand original descriptions give realistic pictures of the general features of the country and the hardships which were the lot of these adventurers in their struggle with a dominant Nature. With a little trouble a large amount of material from original sources can be collected, such as descriptions of scenery and the happenings of nature, of volcanic eruptions and earthquakes and the crossings of the desert, or of strange customs of foreign folk and the kind of life under different climatic conditions. Books dealing with all parts of the world [1] are obtainable and should be available, if not through the school, then through the local library.

We give below a statement on historical geography which was inserted in the first edition of the *Suggestions* [2] but was modified later. It is given here as it may be helpful to those teachers who wish to sum up their lessons by a general survey of the work, or in those cases where a great deal of independent work is done, but the teacher feels it necessary to maintain a general continuity of ideas which will suggest wider interpretation. Some may find the scheme suggestive for incidental lessons on special topics of interest, e.g. a monthly talk with the aid of lantern slides. One such series was planned under the heading " The Advance of Civilization ". The section of the latest *Suggestions* [3] on historical geography should also be consulted.

" **Scheme of Work.**—Elementary lessons on savage life, forests, wild animals and their ways, wild traits in tame animals, stories of the first contact of civilized man with savages; how development proceeds after this, beginning on the coasts, where ships can lie in shelter, then extending inwards along the direction of the rivers, whether navigable or not, advancing more and more slowly as the distance from the sea increases, unless, as in modern times, railways are made, which will be sooner or later according to the prospects of connecting with existing great trade routes.

" Ancient civilization in Asia and Egypt: reasons for priority may be found in the half-desert climate, combined with the abundance of large mammals capable of being brought into the service of man, thus favouring pastoral occupations; the beginnings of cultivation owing to absence of forests and natural irrigation, with fertilization of the soil in places (compare later with the relative advancement found in the half-desert portions of central and south America on the arrival of Europeans). Ships in the Mediterranean would accelerate progress, and cause Europe, with its better waterways and wider area of cultivable lands, to supplant older civilization. The Phœnicians, the Greeks, Rome, Carthage: reasons for the backwardness of central and south Africa, the Roman idea of empire-making compared with that of more ancient empires, fall of the Roman Empire; the Teutonic idea of government, why preserved in England, last on the Continent; rise of modern nations; Spanish power, due partly to advantage of situations at the moment; the trade with India and its nature; the Rhine and Holland. Causes which led to the discovery of America;

[1] Such as Webb, *Africa as seen by its Explorers*; Jones, *Geography by Discovery*.
[2] *Suggestions for Teachers*, 1905. [3] *Suggestions*, 1927, p. 159.

Magellan; the downfall of Spain; civil war in England gave opportunities to Dutch enterprise; rivalry of the French; increasing importance of the New World; the invention of steam power and machinery, impetus given by it to colonization in order to supply the increased demand for raw material and food. Australia, South Africa, Argentine, noting the similarity of climates and productions.

"Every opportunity should be given to make use of anything in our language, religion, institutions and antiquities, which is derived from or in any way recalls ancient forms and culture."

**Place Names.**—The study of place names has of late years become more and more systematized, and the early generalizations, such as appear in Taylor's *Words and Places*, are no longer accepted. In simple fashion, however, valuable use can be made of the names given since mediæval times to parts of the world occupied, or taken possession of, by European nations. Sir Charles Lucas in a paper well worth consulting [1] writes: "the nomenclature of the Empire is extraordinarily diverse: the British names testify to the great variety of agents in making the Empire: nearly all, outside royalty and names derived from religious sources, testify to action, to practical work, and to the immediate agents concerned. There is very little that is picturesque about them." [2]

Teachers should keep this aspect of historical geography in mind because it helps considerably in broadening the cultural basis of the subject. We shall return to this topic under the heading of Regional Survey.

**Biblical Geography.**—Little doubt is felt that the geographical background to the Bible story is proving most helpful to its understanding. The very full sets of lantern slides in circulation indicate this, while the exploration of Palestine in connexion with the settlement of Jews is causing geographical experts to turn their attention to it. For those who are particularly interested there are four papers in the *Geography Teacher* covering the ground fairly completely: XI, p. 359, Professor Fleure, "Palestine"; XI, p. 309, Miss Winchester, "Climate of Palestine"; XII, p. 172, Professor Fleure, "Roads and Travel in Bible Times"; XIV, p. 487, Sir John Russell, "Palestine Revisited".

Professor Fleure deals with the general geography, and boldly takes the Bible statements such as those concerned with the former and the latter rains; the relations of men like Samson and David with the peoples of the plain and of Solomon with trade; the relations of the Jewish kingdoms with Egypt and Syria and Babylon; the trade routes of the Ishmaelites and others which crossed Palestine by various paths; the contributions of the district to trade so carried on; the habits and customs of men of the steppe land and desert. These he takes and puts them in a modern setting.

Miss Winchester deals more particularly with the climatic conditions which make for uncertainty of rainfall in Palestine, and produce a summer

[1] "Place-names of the Empire", *Geography*, summer 1920.

[2] A very useful book covering the same ground has just been published: Meiklejohn, *Place Names of the English People.*

climate of drought and aridity, but a winter climate with fairly heavy rainfall arising from cyclonic depressions which come over the Mediterranean from the Atlantic. Sir John Russell looks at the matter with the eyes of the geographer and the agriculturist. He shows how with modern improvements of water storage and irrigation, and the use of water power for generating electricity, the region is fast becoming a fertile land of wheat, olive, and fruit production.

**Town Studies.**—This subject is bound to appear in the geography syllabus under one heading or another. In an old country it serves very well to bring home historical development and the advance of civilization.

There were towns in this country prior to the arrival of the Romans, mostly it would seem where natural paths through forest and along ridgeways met. Let us take but three examples. Cirencester stood where the great open way along the Cotswolds from the north, with forests on the clays on either side, met the equally open road along the chalk from the east, making for the Severn passage about Gloucester, along which came the iron of the Forest of Dean and the gold of Carmarthen. Old Sarum, too, as Massingham [1] writes, " gathers the ends of a network of green roads between its fist ". Verulanium or St. Albans, approached from the south by way of London and its bridgeway, commanded a rich country in which trading with the continent had sprung up, and which lay on the natural roadway to the midlands by way of the gaps in the scarp and the richer country of Norfolk and around the Wash.

The towns of Roman time make an interesting study, developing in part from British settlements, e.g. Exeter, Lincoln, and London, and as new foundations for military or other purposes. Such are York, Chester, Dorchester, Gloucester, and Silchester. Each one indicates a position of nodal importance, or, at a ford or bridge, the site chosen for defence more than attack, paying all the care as to water supply and food which a military general would naturally demand.

So too the new towns of the period up to the Normans betoken an agricultural people who needs must have centres easily reached for the marketing of cattle, pigs, and sheep. Their trading, because of difficulties in transport, must have been largely by water, and their ports were usually high up the estuaries, out of the way of storm and pirate, where the landing was easy while the land routes were reduced to a minimum. The Normans took over the Saxon towns, and, where they added fresh ones, their positions were dictated by military conditions. Others sprang up in consequence of new industries under the shadows of their protectors, the abbeys. Later mediæval towns were due sometimes to Crown protection, like the staple towns, or to the increase in population. After the Industrial Revolution the determining factor was coal, and later on, water. Now electrical power is becoming dominant. At first the iron industries created new towns on the coal-fields and by the sea, and the pottery towns grew as subsidiary to those of the north

[1] *Pre-Roman Britain*, Massingham (Benn).

and the Midlands, as did the cotton and wool towns of the regions adjacent to iron-working. Then as our export trade grew other towns sprang up on the coast, and some (like Glasgow) flourished exceedingly through developing a great import trade.

Later still came the specialization of industry—the growth of towns making a new fabric, like Dewsbury, the new habit of people to live away from the zone of work which caused the dormitory towns of Croydon, Wallasey, and Altrincham to grow near big cities, and seaside towns like Llandudno and Torquay right away from great centres of population.

Some of the ancient foundations have sunk into insignificance, others have held their own through adaptation to new circumstances, such as the development of motor transport, while others ebb and flow through the ages for various causes. Cirencester, one of the old pre-Roman capitals, is now little more than a large village; so is Lichfield. Lincoln and York are to-day great manufacturing centres with all the marks of ancient boroughs remaining. Exeter continues in the first rank as an emporium town. Canterbury, always an important ecclesiastical centre, yet fell in size as a town until the discovery of coal in Kent gave it new life. Caerleon, a great Roman town, was little more than a village: of late years it is finding new life as a suburb of Newport.

One case will serve to show how geography and history are linked in a town study. Chester stands at the lowest point where the Dee can be crossed—so say the textbooks. This is no longer true, but it was the traditional crossing of the Celtic tribes before the Romans came—safe because here was rock bottom and a narrow channel, as the stream had cut in the rock a new post-glacial course at this point. The Romans found a knob of red sandstone excellent as a foundation, affording good building material, standing out from lower ground of clay and quicksand and thus difficult of approach (difficulties increased by forest growth on three sides), while the navigable river on the fourth gave extra safety and additional trade by sea. The Romans stationed one legion here, and the rich lands of the plain no doubt provided easily for so vast a population. But when the legion had gone Chester fell almost into disuse: and so it remained until late Saxon times, when Danish merchants and others revived its trade. Later, before the Wars of the Roses, the silting up of the estuary reduced its importance. Then through the troubled centuries when Wales and Ireland were in opposition, Chester was important as a strategic point, and so it remained as long as rebellion was possible, since Scotland and Wales might join forces and gain help from Ireland by way of the sea. But with England settled, Chester decayed, to be again revived with the rise of road and railway routes towards North Wales and Ireland, and the industries which arose from the neighbouring coal-fields of Flint and Wrexham.

The capitals of countries and their positions can be examined in similar fashion. Madrid is centrally situated between the various provinces, and continues to be the capital in spite of climatic extremes and awkward

approach. Paris, like London, is not in a central position of the whole, but of the part of France which was of the greatest importance in early times. If London were in opposition, few kings in England could survive even with England in support, for the city offered an opportunity for crossing the Thames, just as Paris, on an island in the Seine, stood protected from attack and a block to progress.

Berlin, to follow Professor Lyde, was the consequence of human design. The Hohenzollern small state between the Rhine and Danube, holding the Nuremberg market, bought the state of Brandenberg which lay between the rivers Elbe and Oder. The Brandenberg arrogant outlook, partly geographical, arising out of steppe conditions, and partly the ecclesiastical arrogance of the Templar Order combined with the Hohenzollern, made for influence through town conditions and trade. Later, through religious and other changes, the state grew and placed its capital centrally for defence and ease of attack. Its growth, suggested by further measures for safety, led ultimately to the state of Prussia, and from Prussia to the German confederacy, keeping Berlin as the central point.

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## CHAPTER VI

# Modern Developments

How far and in what way modern conceptions in the teaching of geography have advanced during the last twenty-five years are strikingly illustrated by a perusal of the syllabuses which were prescribed for the teacher. They are taken from the code in use at the end of last century. We give examples below.

*Standard I.*—Plan of school and playground. Four cardinal points. Meaning and use of map.

*Standard II.*—Size and shape of world. Geographical terms simply explained and illustrated by reference to map of England. Physical geography of hills and rivers.

*Standard III.*—Physical and political geography of England with special knowledge of the school district.

*Standard IV.*—(*a*) Physical and political geography of British Isles, British North America, or Australasia, with knowledge of their products. *Or*:

(*b*) Physical and political geography of Scotland, Ireland, and United States Day and night. Air, mists, fog, clouds, rain, frost, wind, and special circumstances which determine climate and rainfall. *Or*:

(*c*) General geography of Scotland, Ireland, Canada, and United States, with special reference to interchange of productions. *Or*:

(*d*) Geography of Europe generally and of either Canada or Australia.

*Standard V.*—(*a*) Physical and political geography of Europe. Latitude and longitude. Day and night. The seasons. *Or*:

(*b*) Physical and political geography of Europe. Industries and productions of its several countries. Latitude and longitude. The seasons. *Or*:

(*c*) General geography of Europe, with special reference to commercial relations with British Isles.

*Standard VI.*—(*a*) British colonies and dependencies. Interchange of productions. Circumstances which determine climate. *Or*:

(*b*) Physical and political geography of Australia, New Zealand, Canada, and the South African colonies, India and Ceylon. Climate as affected by latitude, altitude, rainfall, forests, nearness to sea, currents and prevailing winds. *Or*:

(*c*) General geography of Australia and British India, with special reference to their industries and to their commercial relations with Great Britain. Colonization.

*Standard VII.*—(*a*) United States. Tides and chief ocean currents. *Or*:

(*b*) General arrangement of the planetary system. The sun. The moon and its phases. The tides. Eclipses. *Or*:

(*c*) General geography of Asia and Africa, with special reference to their productions and trade. Colonization. Conditions of successful industry in British possessions generally.

Not only were these prescribed for treatment but their interpretation was also not left to chance. "Instructions to Inspectors"[1] were issued which taught the teacher what was expected of him, and the inspector, what were the limits of his subject.

"It is very desirable that detailed matter, consisting of names conveying no associations likely to interest children, should be excluded from the teaching and examination of a class in commercial geography.

"The physical geography of a country, on which its political and commercial geography depend, has hitherto been obscured by an amount of uninteresting facts, owing to the uncertainty which often prevails as to the number and character of the political facts which the class should be expected to have learnt. This difficulty has been often felt both by the teacher and the examiner, each regarding the matter from different points of view, according to their predilections for one set or the other of interesting geographical facts. You will, therefore, at the beginning of the year ask for sketch maps of the countries or parts of the world to be studied, on which the names of places which are proposed to be included in the teaching of the subsequent year should be entered or marked,

[1] See, e.g., The New Code for Day Schools, 1895–6.

and suggest for the guidance of the teacher the omission of uninteresting facts or the addition of other names likely to be of interest to the children.

"To obtain the mark 'good' for geography, the scholars in Standard V and upwards, not being half-timers, should be required to have prepared three maps, one of which, selected by the inspector, should be drawn from memory on the day of inspection.

"Such maps, if of any part of Great Britain and Ireland, should be accompanied by a scale of miles, and if of large and distant countries, by the lines of latitude and longitude.

"Geographical teaching is sometimes too much restricted to the pointing out of places on a map, or to the learning by heart of definitions, statistics, or lists of proper names. Such details, if they form the staple of the instruction, are very barren and uninteresting. Geography if taught to good purpose includes also a description of the physical aspects of the countries, and seeks to establish some associations between the names of places and those historical, social, or industrial facts which alone make the names of places worth remembering.

"It is especially desirable in your examination of the Fourth and higher standards, that attention should be called to the English colonies and their productions, government, and resources, and to those climatic and other conditions which render our distant possessions suitable fields for emigration and for honourable enterprise. In order that the conditions laid down for the geographical teaching of the lower classes may be fulfilled, a globe and good maps both of the county and of the parish, or immediate neighbourhood in which the school is situated, should form part of the school apparatus, and the exact distances of a few near and familiar places should be known. It is useful to mark on the floor of the schoolroom the meridian line, in order that the points of the compass shall be known in relation to the school itself, as well as on a map." [1]

The official scheme, while admitting alternatives, was not fundamentally changed for many years, though severely criticized even as early as 1888.[2] The advocates for reform had pointed out the shortcomings of the syllabus for Standard I (which fell far short of the Heimatskunde of German and Swiss schools), and of the sudden jump to size and shape of the world, leaving what goes naturally with it, latitude and longitude, untouched for three years. Standard VII work was necessary if the syllabus for Standard VI, "circumstances which determine climate", was to be understood, for the ocean and ocean currents are potent factors in affecting the climate of all maritimal countries. Here and there teachers had begun to evolve fresh interpretations and follow new methods. But it was not until the *Suggestions for Teachers*, 1905, came in that the immense change in the nature and content of the geography taught in schools was achieved.

**Cause and Effect.**—To-day the general form and aim of our geogra-

[1] Instructions to Inspectors. Code prior to 1902.
[2] Memorial on Code Reform. See Sonnenschein, *Educational Codes*, p. 209, 1889.

phical teaching are very different, and an attempt is now made to introduce the pupil to some conception of the relations between cause and effect. In the early stages great attention was paid to the direct effect of natural phenomena upon man and his activities; for example, the relation of the distribution of plants, animals, and men to climate and geological data. From these early beginnings has developed what is termed the study of distributions and of the world by regions. Gradually we are witnessing the emergence of more specialized methods, and as investigation of geographical problems proceeds, so will new methods of summarizing the knowledge gained be called for.

In schools, however, a definite procedure is required, and here the demands of the seeker after knowledge must not confuse the problems to be faced by the teacher. The latter is forced into using summarized knowledge about climate and its distribution as modified by land and water; about soil and mineral wealth and the effect of these upon human life and the inter-relations of mankind. So great care is required, as generalizations unsupported by fact are apt to be dangerous. Man's work is not governed by logical processes. Even the geographer will find it difficult to account for the manufacture of biscuits at Reading, or marmalade at Dundee. Geographers have in the past been rightly indicted for the ease with which they have settled the ways and movements of men, conclusions easily disproved in the cold light of recorded history and travel, e.g. the routes along which Wales was invaded from England are not those which physical features would suggest. It is unnecessary to push too far into the realm of history, nor can geography free itself entirely from physical and economic conditions.

Experience has led many teachers to adopt a procedure based upon climate. He begins with the heat zones of the earth, which he shows are due to the relation of earth to sun—the daily and yearly movements and consequent variation in length of day. He will be bound to use the wind map of the world, showing how air currents arise from unequal heating which affects ocean movements and rainfall. From a knowledge of these he passes on to the distribution of world temperatures. From rainfall and weather he turns to a study of vegetation, not forgetting to indicate that, however favourable the climate, an unkindly soil may negative the expected result. Given climate, and soil, and vegetation, he can lead on to animal life, including man, and once mineral resources or earth gifts are introduced, he can treat of consequences such as manufactures and the dense population they encourage, with trade between country and country.

Illustrations of these steps are numerous enough, e.g. the tropical winds of the Amazon valley with constant rains compared with the monsoon conditions of India; the dense vegetation resulting from the former and the limited range of animal types found in the forests, as well as the unhealthy conditions of life for men, leading to limited products of use to man and the sparse population of the region.

Some authorities define geography as the record of a struggle between Nature and Man, in which Man advances in civilization and uses superior weapons, with the result that the forces of nature in their reaction upon human life can only be studied fully in regions where uncivilized man prevails. In other words, the distribution of animals and plants, and to some extent the habits of primitive man, exhibit the working of these natural laws—the more civilized Man is, the more does he bring Nature under subjection.

Certain it is that Man has done much to bring the desert under cultivation and is making steady advance against the opposing forces of frost and ice. No longer are plants distributed in the way Nature dictated. What are spoken of as characteristic Mediterranean plants are said to have been developed in Eastern Asia. Some plants like the prickly pear, carried to America, have been taken back to the Mediterranean region changed by skilful cultivation beyond recognition.

That the connexion was clearer in more primitive times is shown by Professor Fleure in his *Introduction to Geography*, where he brings out the relation (1) between the limits of the growth of the beech in Europe and the distribution of humid brown earth (or podsol), a region characterized by mixed farming of cattle-raising and cereal-growing and communities tending to democratic government, (2) of the Mediterranean lands and olive-producing areas with their characteristic civilizations, and (3) the area of the date palm corresponding with lands of little transport and so of isolation, leaving its mark upon the inhabitants.

In any case, to quote Professor Roxby,[1] the study of interaction between Man and his physical environment and of the progressive use which he can make of any particular combination of natural conditions is the chief end of a normal course in geography.

In order that the teacher might do that systematically it is important that an orderly system should be devised. Many attempts have been made to achieve this. Reference to one must suffice. A publication of the Board of Education [2] describes the experiment carried out at the Ruabon County School, directed to the co-ordination of various other subjects of the curriculum with a specially designed course in geography. The working of the geography course required numerous excursions to be made into the realms of physics, mathematics, and history. This naturally led to the conclusion that it would be far better if the purely scientific and historical parts of the geography course could be taught by the master responsible. " It was uneducational and absurd to continue teaching any subjects which were naturally connected with others as if they were separate entities." The idea has been worked out again by the British Association and appears in a pamphlet issued by them headed *The Teaching of Geography*.

The main points are: delay in the teaching of ciimate until pupils have passed through a course on heat; soils come best after an elementary

[1] *Geography*, XIII, p. 376. [2] In August, 1914.

course of chemistry and physics; whilst work on map projections should be delayed until advanced mathematics are begun.[1]

**Natural Regions.**—Another mode of approach in geography suited to the young student has been the subdivision of the world into natural regions. The subject has become one of divided counsels, and various interpretations by such leading authorities as Herbertson and Lyde, Unstead and Roxby have been given. As in all attempts at the pigeon-holing of nature by man, the elusive subject rebels and we find exceptions to all systems of classification.[2]

Our own experiences, dating back to times before the introduction of the term, suggest that it arose in contradistinction to the older political and other governmental divisions, that the main idea was to break up the world into big areas which showed very clearly human activities influenced by physical conditions, and in a less degree by vegetation and other biological conditions. This left various parts outside the areas of the major regions, but made a choice of well-marked portions which could be easily pictured.

Probably the time has come for some elaboration, though we cling to this division for school use because of its extreme simplicity. It must not be forgotten, however, that Professor Unstead undoubtedly has shown that such a procedure fails to meet the needs of a more advanced treatment, especially one in which detailed observations on climate and actual results of cultivation are of more importance.

Others also are evolving plans which are based upon economic usage—upon what Lyde describes as the synthetic process. They imply a procedure more suited to the university stage.

That regions can differ in build and extent is obvious from a study of textbooks upon the British Isles. The major divisions are the same but otherwise they differ.

[1] Locke (1632–1704) indicates his belief in amplifying geographical idea according as the child's knowledge widens in other directions. While an infant, that is before eight or nine, the child should grow accustomed to the globe and representation of land masses. Later on when advanced somewhat in arithmetic he should deal with longitude and latitude and matters akin, after which he may begin to study the globe diligently if the tutor will be careful to distinguish what the child is capable of knowing and what not. A child may be taught anything that falls under his senses, especially his sight, as far as his memory only is exercised if care be taken not to teach him too much at once.

And equally he lays emphasis upon the value of travel in foreign countries at a later stage, though criticizing severely the practices of his own day, which he held interfered with the right idea, which should be the acquisition of knowledge as to the customs, manners, laws, and government of the country he visits.

[2] The subject is one on which much has been written, and the interested reader is particularly referred to an article by Professor Roxby in *Geography Teacher*, summer, 1926, and one by Professor Unstead in *Geographical Journal*, September, 1916.

## CHAPTER VII

# Field and Other Work

The teaching of geography to be real must include observational work. From the outset children must be trained to search outside for the practical application of the points dealt with in the lessons. Though verification is more within their scope than investigation, yet they should be encouraged to work for themselves, especially in simple exercises in the field.

Young children of junior school age need practical training in direction and measurement as the foundation of mapping. Even if their maps be inexact, provided they are based upon the results of measurement by stepping, turning to right or left, facing the sun or away from the sun, they mean a real advance. After walking along streets and returning other ways, children can represent fairly accurately the block they have walked round. Country children will put in the bends of a road or the windings of a stream—the places where a side road breaks away from the main, and where a tree stands overlooking the road. Practice of this kind is important. Children enjoy greatly playing with a large scale map, and finding places and things they know. Habitual usage of a map is all-important for outside work. Physical geography as far as possible should mean actual observation, outside the school, of stream action, hill slope, water and winds, &c.

In towns much can be done by young children in noting when perishable goods appear in shops and whence they come, market-day practices, charabanc traffic and its destination.

In senior schools regular observations and recording of weather data are useful, though it is discouraging to miss two days every week. Even if records are incomplete, the children should be made familiar with the ways of the observer. If circumstances are more favourable schools should exchange their records with those obtained by schools in other districts. No rule can be laid down as to map-making with tape and chain, plane table, and simple theodolite, for this training will depend entirely upon the individual bent of the teacher. Children so trained, however, gain considerably from the practice in accuracy which is required. The work also affords opportunities for connecting geography with mathematics and drawing, and wherever it can be taken without unnecessary disorganization it should be included in the curriculum. But town conditions and, in rural places, staffing difficulties are known to place many obstacles in the way.

Still a great deal can be done. A school at Harrogate, for example, followed a plan which may be found worthy of adoption elsewhere. An area was chosen which would afford space for inquiry over a period of several years. A map was enlarged and multiplied and each child supplied

with a copy. Enough walks were taken under supervision to fix points. Information from books and elsewhere was brought in. Gardens and roads nearby were measured and drawn to scale and natural objects collected and discussed. The roads farther away were mapped and the trees studied throughout the year; a region was next taken and studied as to cropping, roads, and hedgerows. Its history was also studied. Old roads were traced and features like water-mills examined and contours carefully traced on the ground. In the end the children had learnt fairly thoroughly how to use an ordnance map.

School journeys (see Vol. IV) to a district or a place abroad where geographical features, mountain or seaside, give opportunities for a wide field of study, are recommended. The visit is prepared beforehand by special lessons and often by the compilation of an illustrated guide-book, in which the in- and out-journeys, and the work of every day, are set out in detail. The school routine is followed only so far that reading and writing are required for note-making and letter-writing. Every day has its own programme, and the teacher has prepared himself for each by previous visits and the gathering of information. Occasionally a local expert will render assistance by special talks and lessons. Care is taken to make much of physical features and local industries, to study the life of the district and to see how it is connected with the environment. By means of photography and collections of specimens the pupils learn something of zoology and geology. Local history and architecture are also introduced as much as possible. In short, the general idea is to create a background for future school lessons rather than to introduce children into the ways of the investigator.

A conference of experts discussing this subject a few years ago made the following recommendations.

(*a*) The children should go out as explorers and discover the main points of the geography of the district for themselves, making maps as they go along and taking observations, e.g. on the nature of the soils, on the types of plants, on the speed of rivers and the possibilities of the rivers for transport purposes.

(*b*) Pupils should be graded into a number of small parties, each of which is detailed to study some particular aspect of the region under observation. Whatever method is used it is essential that the teacher should know the district thoroughly.

(*c*) A complete survey of the school region should be undertaken, and several day journeys made to study various aspects of the area under survey.

(*d*) The survey should include a study of the industries of the school region; the history of the reasons for the growth of each industry; the geographical setting for each industry; and the sources of raw material and disposal of manufactured products should be studied.

(*e*) A study of a river basin: various sections of the country should be examined, results mapped, or otherwise expressed; comparisons made

with other areas. The work of schools in different types of country might be exchanged.

(*f*) A general study should be attempted, e.g. the use made of rocks, illustrated with reference to the actual rocks found in the home region.

Schools have gone some way even in this direction, though " Regional Survey " in the true sense is a task rather for adults. The methods adopted by children may not be scientific and the inquiries will not be entirely reliable, but in some cases a fairly exhaustive study of the surrounding district has been made. Children gather stories from parents and grand-parents, they exhibit much patience in picking up details from land workers, and they find much relevant information in old newspapers and guide-books, letters, and diaries.

A school can indicate lines of inquiry; children will pursue them, each in his own way, and it is not difficult to secure expert assistance on the usage of the information so secured. Libraries, too, in small towns very often contain books on local history and information from which extracts can be made.

The Geographical Association have established a special branch to assist its members interested in such work and have a postal lending library of special interest. They have recommended a series of symbols for mapping, showing (1) cultivated land under rotation, permanent grass, and under fruits and vegetables; (2) woodland, deciduous and coniferous; (3) uncultivated and unenclosed land (i) dry or heath, (ii) wet or peat. More useful still, the Regional Association (of Le Play House) have printed a sheet labelled " Discovery ", which is intended to be fastened on the school wall, and sets out the questions which can almost always be asked in any district under exploration. Regional survey work is essentially a study of things, and as such acts as a corrective to the natural tendency of schools to emphasize book study. Secondly it encourages the habit of investigation and brings the various lines of school work to a focus—as one writer expresses it, " it provides a synthetic basis for education ". Thirdly, the study is intended to bear upon existing conditions, pointing out defects which should be removed, what is particularly worthy of preservation, and the lines which future development should follow.

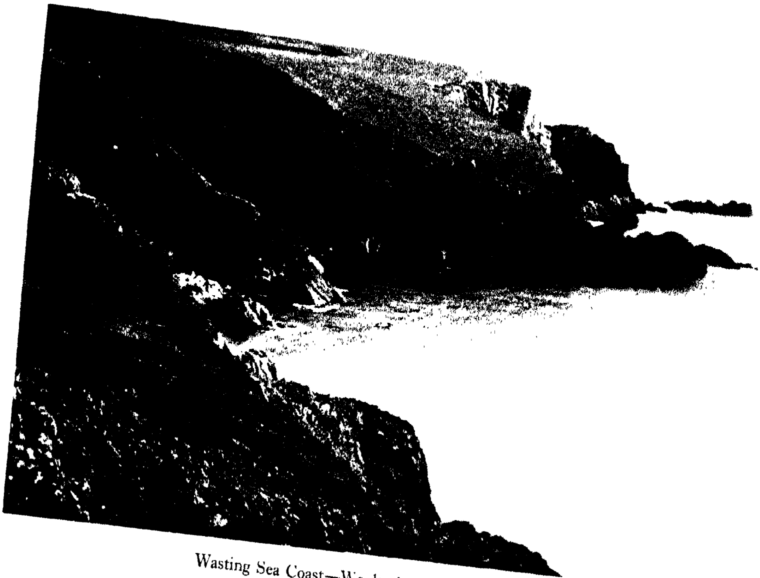
Schools do not find they can pursue many lines of investigation at the same time: while the collection of illustrations and quotations may be general, it is not uncommon to take up one particular line of inquiry and carry it as far as possible before adopting another.

Such inquiries fall under three general heads:

A. Geography—rocks and rock structure, including soils, natural features, climate and weather, vegetation natural and cultivated.

B. History—prehistoric, Roman, and Early Saxon. Middle Ages, our own times.

C. Existing conditions—agriculture, industry, including communications, social conditions, recent improvements and their control.



Wasting Sea Coast—Wooltack Park, Pembrokeshire

Pebble Beach—Porthkerry, Glamorgan

LAND FORMS—II

Such work has been officially encouraged. Thus a scheme for the collection of rural lore in Wales was instituted in 1919 " in order to attempt the formation of a kind of Welsh Domesday Book ". Schools which desired to take part were to be supplied with ordnance survey maps on which to record facts such as the survival of any old or curious custom or crafts; the existence of any rural industry; peculiar words and phrases, dialects and strange pronunciations; ancient implements; old markings for cattle, archæological notes—relics of bygone ages. Too much reliance should not, however, be placed upon the facts thus collected.

Surveys of a more elaborate kind have been established in many districts on the lines indicated in *Sociological Papers on Civics* by Professor Geddes. We need not go into the details of his scheme, but it may be of assistance to set out the different branches of the survey he advocates.

| | |
|---|---|
| Regional Survey | topographic.<br>economic.<br>anthropologic. |
| Historic Survey | ancient.<br>recent.<br>contemporary.<br>incipient. |
| Vital Survey | psychological.<br>civic.<br>survey of evils. |

In the historic survey, contemporary points upon revolution, empire, and state finances may be dealt with, and in the incipient section, matters of new lay-outs of districts and settlements, new buildings and plans for superior and healthier types of human habitants.

In the vital survey the psychological and civic sections deal with the acts and ideals of individuals and communities, while the survey of evils touches upon disease, crime, folly, and vice.

Some teachers take a particular line of study and apply it to a wide region rather than to the home country. Thus one teacher made collections of photographs and drawings illustrative of the fact that districts varied greatly as to the type of architecture in favour. Houses show differentiation according to the materials used. Cobble is used for the walls in Devonshire and the south-west where clay and mud abound, and flint is used in chalk districts. Half-timbered houses are plastered outside in East Anglia and elsewhere where stone is too porous; weather boarding outside is favoured on half-timbered houses in Kent where timber was abundant. Stone slates are employed for roofing in Oxfordshire and the Cotswolds; windows and architecture of the north show a plain geometrical arrangement where the hard grits are much used.

The London County Council have encouraged such work from time to time. For example, an interesting memorandum has been issued by

them to their teachers on a "Survey of the Brent Basin" made by one of their schools. Again, in a slum school in Lambeth an energetic teacher set his boys inquiring into practices of road-workers, types of carts, lamps, street paving, dates and styles of buildings, positions of factories and workshops, open spaces, public houses and important institutions. In the end he was able to prepare a very full story of the borough, exceptionally well illustrated by maps, pictures, postcards, and newspaper cuttings.

The Hertfordshire scheme of regional survey established with the support of Earl Lytton, but which for financial reasons fell into disuse, set out as its purpose, (1) to prepare and keep up to date a history of the locality in question, (2) to build up a regional museum illustrating the work done, (3) to enlist the services and train the powers of the children, (4) to make the school a centre of interest to the neighbourhood, (5) to secure the co-operation of local resident teachers and children in the task of arousing a common interest in their surroundings.

Experts like Mr. Page, the editor of the *Victoria County Histories*, and Sir John Russell have done much to encourage particular aspects of the work. Mr. Page has indicated modes of studying settlements from the point of view of plans and positions, e.g. the scattered or disposed settlements found in Wales and the west and north of England, nucleated settlements away from lines of communication, roadside settlements, the ring fence settlements of the forest, the smaller market town, bridgehead towns, and double towns such as Holt-Farndon on the Dee, larger towns and cities, rectilinear or concentric in plan, bastide towns after the French plan built at the time of the Edwards.

Sir John Russell has shown the way in which to connect the study with rural industries. He gives as guides in interpreting conditions in England, the following main data. Dry conditions favour seed production; wet conditions favour leaf production; very high rainfall causes peat production and is inimical to agriculture. Very light sand and gravel soils cannot profitably be cultivated and are left waste; light soils containing a little more clay are easily worked by hand or tillage implements and are used for crops requiring considerable attention, as for market gardening. Sandy and chalky soils belong to this group. Soils with more clay form the middle series, the loams, which are best for agriculture.

With more clay, cultivation becomes more difficult. In places wheat, barley, and oats, beans and mangolds can be grown, but less often swedes and potatoes. Sheep are not suited because of the parasites. More clayey soils form grassland, but when very heavy are not used and run to woodland. Thus a study of weather maps, of a geological map, and a soil map will help very considerably to an interpretation of the agricultural occupations of the country. Occasionally one factor is dominant, at times the other. For example, the geological dominates about Market Harborough, where the lias clay gives rise to a purely grazing country and so to hunting; the climatic dominates at Penzance, where, protected from winds and open

to the south, early potatoes and broccoli are grown; and again at Hoo in Kent, where proximity to the sea also produces early crops.

A third factor, viz. the distribution of the human population, also intervenes to disturb the normal working of cause and effect. This has given rise to the market gardens of Wisbech and Evesham, which serve Lancashire and the Black Country. Yet another illustration is afforded in the movement and varying periods of sale for cattle. Where cattle are kept indoors, turnips, swedes, and mangolds as well as corn must be produced. Hence in such districts the presence of a comparatively large agricultural population in the villages. On the midland clay lands, however, the summer rains permit of the cattle being kept on grass feed throughout the year, and the concentration of population in large villages is not required.

Chalk lands, if clay covered, are devoted to woodland, but a thin soil is often arable and is rendered fertile by keeping sheep. So again, orchard land demands sufficient rain in late summer and autumn accompanied by sunshine for the swelling and ripening of the fruit.

Another mode of development is followed at Salisbury, where the Blackmore Museum offers very full opportunities for local study. The curator takes trouble in giving to parties of children demonstrations which bring out the various aspects of regional study, and thereby encourages the pupils to bring together many objects of interest which otherwise might be missed. "Nothing is more remarkable," writes one authority, "than the large amount of individual and often spontaneous work which the boys themselves contribute. When such interests have been assured, hardly a week passes without some boys bringing up a new point of local interest —it may be an odd name of a field descriptive of the old manorial economy, perhaps an old picture or book, an old story, the memories of a grandparent, a fragment of a will, a lease or a copyhold, an old coin, a flint implement, a mediæval tale, or an old family Bible with the records of a local family for many generations."

Work of this kind, however, now appears on a small scale in many schools. A school at Stroud has prepared "A list of reminders of our Ancient Woollen Industry", which includes, among others, names of public house signs, quotations from tombstones, and inscriptions on houses, village after village.

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## CHAPTER VIII

# The Geography Room and its Equipment

In most of the new schools for senior pupils it is to be expected that a room specially intended for geography teaching will be provided. But even so, local authorities, for a time at least, are scarcely likely to provide such liberal equipment as that of the secondary schools. Still there are

certain features for which every special room should provide. Firstly, there must be a good library of books for reference: instruction in geography is not worth much if up-to-date and reliable information is not available. Next, ample cupboard space is required: the teacher of geography must have models and equipment such as demonstrate the movement of the sun or the types of land forms. Large supplies of maps either bought or made by the pupils should also be stored. There are many forms of apparatus now on the market for the rapid production of outline maps for class use. Some teachers favour a map cupboard from which maps can be suspended, but large-size drawers serve better for smaller maps and collections of illustrations.

The room should have a lantern, or one of the modern substitutes, and devices for readily shutting out light. It is convenient to have a surfaced wall instead of a curtain on which the pictures can be thrown. A portion covered with aluminium paint serves very well. Lantern slides can often be borrowed or may be easily and quickly made. School clubs may assist greatly in bringing together sets which should be properly arranged and classified.

Such a room can hardly have too much blackboard space for maps and sections. There should also be proper provision for the simultaneous hanging of different maps for comparison and for their quick removal. A large globe showing relief is helpful. This should be quickly brought into use or placed in a safe position for observation, perhaps slung on a pulley from the ceiling. A second globe with plain blackened surface is favoured by some. Flat tables for map and model work are absolutely necessary. They should be big enough to take ordnance survey maps of the normal size; they should also be light enough to be easily shifted to the sides of the room in order to allow of enough floor space for big maps to be placed horizontally and properly orientated.

Wall space for pictures is valuable, for geographical pictures play a most important part in the teaching. But in many rooms most of the wall space will be required for other things, and a place must be found elsewhere for the selection of geographical pictures, without which any such room is incomplete. Some teachers like to have collections of small pictures showing scenery and the like framed or mounted as a dado, but this should be done only if the space can really be spared.

*Indoor Study* usually implies (1) the solution of problems by the aid of map and atlas and reference books; (2) a comparison of maps of different types, rainfall, soil, population, road and railway, &c.; (3) preparation of special maps of statistics and graphs; (4) modelling. Of course a number of instruments used in drawing and mathematics are required, and transparent paper is necessary so that maps can be laid one over another to see relations of rock to land form, of soil and weather to cropping, of industries to population. Transparent paper ruled in squares helps considerably in the copying of maps.

**Models and Maps.**—Some teachers are content to model various

features in clay or plasticine—to cut longitudinal and transverse sections but not to trouble about scale.[1] We have seen sheets of linoleum used because they give some idea of contour, and lend themselves to folding back in order to show sections and putting together again if not cut right through. Others prefer to work with plasticine for making accurate representations. Miss Sanders of Cheltenham College [2] has given an interesting account of an adaptation of a well-known method which she uses. Sections of a simplified map (at right angles to one another) are taken at regular distances and cut out in cardboard to scale: instead of fastening them in their correct position and filling in the space with plasticine finishing by eye measurement (McMichael's method), she divides the children into groups and provides each group with one section which can be redivided so that each child cuts out one slab of plasticine. When all are ready they come up in turn and place the slabs in correct position. Some adjustment is required when all are in position to get the slopes correct; but block models of the kind favoured by Davis are quickly made in this way.

Sketch maps are always recommended for habitual use when making notes and answering examination papers: but the productions of children are rarely satisfactory except for occasional use. Miss Taylor [3] holds that greater accuracy can be secured if more careful attention is paid to instruction in rapid map production. Her suggestions are of interest. She classifies maps as:

1. Selective or analytical sketch maps. These are intended to separate one feature from a full map, say the railways or rivers, or the accurate positions of towns. Accuracy in such cases warrants tracing or careful measurement.
2. Interpretative sketch maps: these are meant to bring out forcibly some particular feature—a scarp or a river gorge. Accuracy here might even hinder; exaggeration is allowable.
3. Synthetic sketch maps. Obviously the map of the district must be accurate, but some of the new facts to be entered upon it may not call for the same accuracy, e.g. rainfall or crop maps.
4. Factual sketch maps. These are sketches from sources impossible for the children to investigate. Teachers should take a good tracing, and from this dictate to the class for entry on a grid map in their notebooks.
5. Illustrative sketch maps. These are of the usual type. They are drawn freehand, so close accuracy cannot be expected. But they should be generally accurate in representing the main features, e.g. a river parallel to a scarp *or* the country not extending beyond its mountain boundary lines.

[1] Books like those of Martonne and W. M. Davis show how useful models may be in bringing home points in physical geography.

[2] *Geography Teacher*, Autumn, 1919.

[3] *Geography*, XV, p. 133.

6. Regional summaries are often asked for in examinations and are useful as summaries. The base map must be accurate, but the skill lies in using symbols for other matters which are definite and clear.
7. Mnemonic sketch maps. For easy memorization of direction and position of important places and features.

At the Wembley Exhibition, Miss Mitford, then lecturer in geography at Stockwell Training College, exhibited a series of striking maps made on what is called the " Unit Dot " system, which is much used in the United States. The Unit Dot system is the placing of an appropriate number of dots, each representing a definite unit, be it of population or production, within each area. The size of the dot can be varied, or the dots can be brought nearer together to make a particular portion of the area where it is known that distribution is especially dense.

This method seems to be growing in favour as lending itself better than colouring or shading to maps of certain types, e.g. agricultural returns, statistics of mind production, returns from industrial regions. Messrs. Ashby and Howell have used such maps for the agricultural returns for Wales.

**Railway Studies.**—The study of railways is readily adaptable to school work. Discussion easily arises on such matters as the areas concerned with the industry as regards supply and demand—raw and finished products, and the character of the traffic concerned. The influence of natural features upon the direction of the railways and their traffic—of the railways upon the growth and importance of towns and upon the exploitation of mineral wealth and agriculture. Railway companies are generally very ready to supply great quantities of useful material and Bradshaw's time-table is a constant help.

**Newspaper Geography.**—The study of the newspaper also has its advocates. For example, in some schools a large-scale map is drawn on a sheet or the floor and flags shifted about as reports of movements of ships come in. Other information is recorded in like manner. Again, sketch maps are made to show distribution of various articles of food or letters to certain destinations. Sometimes a coasting vessel is followed journey after journey throughout a year. Sometimes on a world map the dates are indicated over a region whence a particular article, say oranges or apples, is coming in quantities into the English market.

Weather information is obtained from the newspaper when the Meteorological Office reports are not to hand. Followed from day to day, children soon acquire the capacity to interpret weather from the movements of cyclones and the distribution of air pressure.

**Atlases.**—A few words may be said about atlases. Children prefer coloured maps to those in black and white. Orographical maps for the most part are required, and each should show longitude and latitude. There should be a complete index so that children can rapidly discover

any place by the number of map and position indicated. Maps which attempt to do that which a child can and ought to do for himself should be avoided. There are many atlases containing statistical maps and diagrams which belong to this order.

Combinations of map and map questions may save the teacher trouble, but it is far better to evolve a series of questions closely related to the teaching in the school and the material available for reference. After all, the ultimate purpose is to make the child so familiar with a general atlas and its interpretation that by its aid he can attempt to solve any problem which arises in conversation or business.

**Individual Work.**—This method, which has grown into favour of late years, is less applicable to geography than to some other subjects because practical work is becoming increasingly important. Instruction in geography, therefore, does not lend itself entirely to the method of " assignments ". It is difficult to prove from examination results that the system is more successful than others: but interest appears to be maintained with greater ease. In one school, a selective central school, where the method is adopted a minimum assignment is fixed which all must achieve, while there are extra suggestions, exercises, and questions for the better children. The method is well understood, hence only the variations from the normal in this case will be indicated. Of the two lessons a week, one is devoted to " class work ", oral recapitulation of work previously prepared, with further instruction by the teacher, sometimes on particular topics asked for by the children. These lessons are varied by lecturettes by the children working in groups upon subjects which crop up during lessons. To these lecturettes younger children may be invited. Besides a very good library, a series of folios has been prepared, containing useful printed material of various types (some classified according to subjects), illustrations, and collections of rocks and plants. All the material is freely used and the collections are rapidly increasing.

As an example of the work, four assignments may be given.

(*a*) Form I, Children of 11–12.

*The Tropical Grasslands or Savannahs.*

1. See p. 234 in *The Tour of the World*, and pick out all the tropical grasslands. Say where they lie in relation to the tropical forests. Is the climate hot or cold? When does the rain come?
2. Read Wallis, p. 102, paragraphs " Hunting for Sport " and " Park Lands and Immigrants ". Do any trees grow on these park lands? If so, where and why?
3. Why do more wild animals live on the park lands than in the forests? Name some. Say whether they are herbiverous or carnivorous and if they live in herds or in pairs. Say what you know about their speed and colouring.
4. The grasslands are more easily cleared for cultivation than are the forests. Explain why. Name some of the crops grown.
5. Read all you can about the negro of the Sudan: say why he lives a settled life and is not a nomad.
6. Make a list of all the Savannah lands in the world and say where each is. Arrange in two columns.

Prepare, in groups, descriptions of interesting plants and animals and peoples of the Sudan.

(*b*) Form II, Children of 12–13. Fifth Assignment.

*Drought in Australia.* Answer in order set.

Drought is Australia's chief drawback and is always present. In this assignment we shall study this drought and also the means which are being used to combat it.

1. Trace a map of Australia and shade all the lands having less than 10 per cent of rain a year. This is desert. Shade in another way all having less than 20 per cent. In this part the rain is insufficient for agriculture without irrigation.

2. Now say why so much of Australia suffers from drought. If the great dividing range extended from north to south along 135 E. longitude instead of where it does, would there be any difference in the amount of desert? Now let us see various methods adopted to water the land artificially. This is called irrigation. One method is by obtaining water from artesian wells. Read pp. 76–7 in Page's *Australia*; p. 49 in *Essentials of World Geography*; p. 42 in F. 1. Study pictures in *Clarendon Geography of Australia*, p. 207, fig. 65; Reynolds' *Australia*, p. 106; *The New World of To-day*, Vol. VIII, p. 73.

3. (*a*) Copy the diagram showing a section of an artesian well from Brooks, p. 222, or p. 49, *Essentials of World Geography*.

(*b*) Copy the map from Page, showing the part of Australia where water may be obtained from artesian wells.

(*c*) How can there be such a collection of water beneath the surface in so dry a region?

(*d*) Account for the water coming up the bore without any pumping, as seen in the pictures.

4. A common sight in an Australian farm is a " silo ". It is a storage place for preserving green grass, vegetables. It is usually a pit or tank lined with concrete or brick and is practically airtight. Look at Black's *Travel Pictures*, No. 12, on the west wall to get a good idea of a silo. (*a*) Why do we not see silos on English farms? (*b*) Why is it necessary to have the silo practically airtight?

5. Look at pictures: *Tour of the World*, p. 97; *World we Live In*, Vol. II, pp. 352–3; F. 1, p. 421; *The World and Australia* (Howarth), pp. 123–31; *The World of To-day*, Vol. VIII, p. 36.

Now say in what other ways besides artesian wells irrigation is carried on in Australia.

(*c*) Seventh Assignment.

*Australia. Aborigines and Settlers.*

1. What people were the first to discover Australia? What names bear witness to their efforts? What Englishman discovered the east coast? How long ago? What reasons are there for the lateness of the discovery of Australia?

2. When Australia was discovered by the European explorers they found a number of black natives or aborigines living there. Find out all you can about these and write a summary of it.

3. When Europeans first came to Australia there existed in the land no domestic animals, no cultivated plants, and even wild food plants were very few. Do you think that these facts were the cause of the backwardness of the Australoids? (Australoids = scientific name for the natives, who are more often written about as " Black-fellows ").

(*d*) Form III, Children of 13–4. Ninth Assignment. St. Lawrence Basin.

*Ontario.*—1. Revise the map of the Great Lakes and canals, linking them with one another and with the rivers near which you made in the third assignment.

2. Where is the Lake Peninsula? Why is fruit-growing important there? Name some other industries and three of its chief towns. Consider why it is the most densely populated part of Canada.

3. Read about Ontario's marvellous mineral wealth and write a concise summary.

4. Draw a detailed sketch map to illustrate the advantages of site possessed by Montreal.

*Quebec.*—5. The main industry in this province is lumbering. Say how the

rivers of the Laurentian Plain aid the industry. What other industries besides lumbering are dependent on the forests?

Read descriptions of the work of lumber-jacks and of the fur trappers.

6. Why is French spoken in parts of Quebec while Ontario is mainly English-speaking?

Group work: Prepare speeches as Emigration Agents for one of the provinces of Canada. Arrange so that there shall be " agents " for every province.

Another example of work on somewhat similar lines is taken from a plan in common use in Northamptonshire schools, used as a device to keep the grades of children of a senior school all working to the syllabus. The general plan is to assign different types of work for each of the three groups. The lower group (A) would be engaged in " Things to do "—finding places in atlas, sections, local mapping, weather records, use of globe. The average group (B) would make written answers, giving deductions and comparisons from the maps made by A: inquiries from books and atlases. The upper group (C) would search for causes on maps, draw deductions by method of elimination, and write about original subjects.

Maps should be done on tracing or butter paper to facilitate comparison, and be of the size of the atlas map. Orographical maps should not be required if in atlas. Each map should contain only one set of facts as a rule.

The following set of graded questions illustrate the type of knowledge and work which is expected of the children.

A. 1. Between which latitudes does Ceylon lie? Is this island north or south of the equator?

2. What towns in India lie on, or very near, latitudes 13, 20, 25 N.?

3. Is India east or west of Britain?

4. Find the latitude and longitude of Colombo, Calcutta, Delhi, Rangoon.

5. From the scale on your map measure the distances: Bombay to Calcutta; Peshawar to Colombo.

6. Measure the circumference of a large globe by a piece of string or narrow tape. This is about 25,000 miles. On this string mark each 2000 miles.

7. With the string of No. 6 measure on the globe the shortest distances from London to Bombay, Calcutta to Singapore, Bombay to Capetown, Colombo to Perth (W. Australia), Southampton to Bombay via Cape of Good Hope.

8. Draw a section across India at latitude 15° N., and another from Lhasa to Calcutta.

9. Draw sections along the courses of the river Ganges and Indus, and another along the railway from Bombay to Calcutta.

10. Trace a map of India from your physical map. Shade all the land over 1000 ft. in altitude.

11. On other traced maps of the same size insert the rainfall in summer and in winter.

12. On two other maps show the summer and winter temperatures.

13. On another traced map mark and colour the different natural regions.

14. From the maps of No. 11 make another map showing the areas with less than 10 in. of rain in the whole year.

15. On squared paper draw a graph to show the following monthly average temperatures at London:

| J. | F. | M. | A. | M. | J. | J. | A. | S. | O. | N. | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 41 | 43 | 48 | 54 | 60 | 63 | 62 | 58 | 51 | 45 | 41 |

16. Draw on tracing paper, by putting it over a piece of squared paper, graphs of the same scale as in No. 15 of the monthly average temperatures following:

| | J. | F. | M. | A. | M. | J. | J. | A. | S. | O. | N. | D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Simla | 40 | 41 | 51 | 61 | 66 | 68 | 65 | 63 | 61 | 57 | 51 | 44 |
| Delhi | 59 | 62 | 74 | 84 | 89 | 93 | 87 | 86 | 84 | 79 | 68 | 60 |
| Bombay | 74 | 75 | 79 | 82 | 85 | 83 | 81 | 80 | 81 | 80 | 80 | 76 |
| Colombo | 80 | 81 | 82 | 83 | 83 | 82 | 81 | 81 | 81 | 81 | 80 | 80 |

17. Draw a graph on squared paper of the average monthly rainfall at London, from the figures given:

| J. | F. | M. | A. | M. | J. | J. | A. | S. | O. | N. | D. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2·9 | 1·6 | 1·8 | 1·6 | 1·9 | 2·3 | 2·4 | 2·4 | 2·2 | 2·6 | 2·3 | 2·1 |

18. On tracing paper, as in No. 16, draw graphs to show the average monthly rainfall at each of the following places:

| | J. | F. | M. | A. | M. | J. | J. | A. | S. | O. | N. | D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Delhi | 1·0 | 0·5 | 0·7 | 0·4 | 0·7 | 3·4 | 8·5 | 6·9 | 4·5 | 0·5 | 0·1 | 0·4 |
| Calcutta | 0·4 | 1·0 | 1·3 | 2·3 | 5·6 | 11·8 | 13·0 | 13·9 | 10·0 | 5·4 | 0·6 | 0·3 |
| Bombay | 0·1 | — | — | — | 0·5 | 29·8 | 24·7 | 15·1 | 10·8 | 1·8 | 0·5 | 0·1 |
| Colombo | 3·0 | 1·7 | 5·5 | 8·8 | 13·5 | 8·2 | 5·4 | 4·5 | 4·9 | 12·9 | 12·7 | 6·4 |

B. 1. Draw a graph of the monthly temperatures obtained from the school weather records. In which months are the temperatures greater than in London? In which months are they less?

2. If you cannot do No. 1 because the school records are not complete, try to obtain those of the nearest meteorological station.

3. Compare the average temperatures, month by month, of Simla and London. Find their latitudes.

Compare also the average temperatures during each of the four seasons.

4. Find the average temperatures for summer and for winter at the places in A. 16.

Do these figures agree with those on your temperature maps?

These averages must be made for the same number of months as are used in making your temperature maps.

5. Allowing a drop in temperature of 1 for every 300 ft. in altitude, find from the maps the actual temperatures in summer and in winter at Mysore, Quetta, Darjeeling, Srinagar.

Compare these figures with those for Simla, in A. 16.

6. If the amount of rainfall also measures the cloudiness during each month, can you explain why

(*a*) June is hotter than July in Delhi, but not in London?
(*b*) May is the hottest month in Bombay?

7. From the maps of A. 11 make another map showing the areas with over 5 in. of rain in both summer and winter.

If two crops a year are grown here, in which months will they be harvested?

8. Rule a piece of tracing paper into squares, each representing 2500 sq. miles, from the scale on your physical map.

Find the approximate areas of India, the lowlands of A. 10, the desert of A. 14, the areas of B. 7.

9. Take the natural regions of A. 13, the altitude map of A. 10, and make a table showing the approximate areas of lowlands and *not* lowlands in each region.

10. From the section of the Ganges River of A. 9 measure the lengths of the river in the highlands, uplands, and lowlands.

How far is the steepest part of the course from the mouth?

Find the average fall of the river in the lowlands in feet per 100 miles.

11. If the fall of the Ganges in B. 10 is uniform, find the altitude of Patna, Agra Delhi.

12. From the graphs of A. 16 and A. 18 would you think that Delhi, Bombay, and Colombo are in the same natural region?

13. Find the actual sea journey from London to Bombay in miles.

How much longer is it than the distance of A. 7? What is the pace of ships in miles per day which reach Bombay from London in 15 days?

14. From the maps of A. 11 make another showing all rivers which are parched during the dry season.

15. About 400,000 sq. miles of land is under crops each year in British India. How does this figure compare with the results of B. 8 and 9?

16. Irrigated land in India amounts to roughly 48 million acres. What is this in square miles? How much per cent is it of the 400,000 in B. 15?

17. Of the crops producing flour in India wheat provides 11 per cent, rice 37 per cent, millet and maize and others 52 per cent. Why is the rice less than 50 per cent?

18. From the graphs of A. 16 and 18 write an account of the weather at Bombay during each of the four seasons.

C. 1. Make traced maps, for comparison with your others, of the density of population, summer cloudiness or sunshine, and the areas of cultivation of the more important crops.

2. Rice is the usual grain on the coastal lowlands and along the Ganges Valley almost up to Lucknow. Is it true that high density of population occurs in the tropics only where rice can be grown? Which areas are likely to export rice?

3. Find out what is meant by a famine district. How do such differ from a desert? What corn can be grown?

4. Mark on a map the areas in which rice is not the usual corn. Of these areas colour the famine districts. Find out whether any countries at all export maize or millet regularly.

5. Wheat needs two months of temperature just over 60° F. for ripening. To what altitude must one go in latitude 30 near Lahore to be able to grow wheat (*a*) in summer, (*b*) in winter?

6. Tea can withstand frost, but coffee cannot. Find slopes over 2000 ft. in altitude on which tea is possible, but not coffee.

7. Ceylon has two wet seasons, and two ripening seasons. How long does the cooler ripening season last? When will its crops ripen? Where in India will the same crops ripen in September? What will these crops be?

8. Sugar grows best where there is salt in the air, and is usually ready for cutting in September; but it needs some drainage. Find some really suitable areas.

9. Tea and tobacco are leaf crops. Find areas where they are possible, but a seed or fruit crop is impossible.

10. Is it true that the sparsely populated areas agree in density of population with the amount of rainfall?

11. Make a map of the Deccan to show the south-facing slopes. Which of them get sea winds? What will ripen on the others?

12. The main cotton crop comes from the Deccan uplands. What will be the summer temperature? Where in the lowlands of India is there the same temperature and rainfall?

13. Why are some trees and shrubs evergreen? In which regions do you find them? Why?

14. The best grade of rice is called Patna. Find the districts in which rainfall, temperature and altitude suggest that this grade of rice could be grown. Find the area of each.

15. Try to find the climatic conditions most suitable for jute, indigo, teak.

16. Monazite sand is produced in Mysore, and is the largest supply yet known. What is its importance? Where is it wanted?

17. Work out the voyage from London to Bombay with dates and ports of call. Do the same for the overland route via Brindisi.

18. If air routes were inaugurated from the Mediterranean coast to Delhi, with day travelling only, write a diary of a journey from London via Brindisi, Haifa, Basra, to Delhi.

**Pictures.**—A committee on school pictures reported to the Board of Education in 1927: " A picture not only stimulates intelligence by aiding the child's imagination to visualize history, geography, mathematics, but gives a sense of actuality and relates the information of the lesson or textbook with real life " [1] The committee speak of pictures as falling into two groups: (1) those which can be placed on the wall or easel for class demonstration; (2) those for use for group or individual study by the children. The former, they say, can be replaced by the lantern slide; the stereoscope takes the place of the second.

" The essentials," they write, " of the demonstration picture are that it shall: (1) be suited for its special purpose; (2) present an accurate, vivid and convincing picture of the features under consideration; (3) not be overloaded with unessential detail; and (4) be on a sufficient scale to be easily visible to the whole class. The essentials of pictures for group or individual study are that they shall: (1) be clear and not overloaded with irrelevant detail which may distract attention; (2) be accompanied by some indication of the points which they particularly illustrate and (where necessary) of the scale of the drawing; (3) be on loose sheets so that comparison of different pictures is easily possible. It is convenient if the pictures for group work are of similar size." [2] The committee regard these as for occasional use, not for permanent framing as school decoration.

There are plenty of pictures which are useful for both purposes. " Posters ", which are looked at askance by the committee for wall decoration, and photographs are very helpful to the geographer and should find a place in the cupboard set aside for illustrations.

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## CHAPTER IX

# The Teacher of Geography

For the supply of teachers of geography we have to look both to the university and also to the training college: to the university for direction and guidance in the choice of material, the limitations and extent of our boundaries, and for pioneer work in the opening up of fresh fields; to the training departments and colleges for the application of these principles and this knowledge in wise methods of teaching.

Already geography has won its way into the modern university curriculum. Most universities now recognize it as a subject in the degree course; professorial chairs have been founded in some universities and their establishment in others is but a matter of time. Its popularity may be judged from the number of students who pursue the subject. In the

[1] *School Pictures*, p. 20, Board of Education Pamphlets No. 52. [2] *Ibid.*, p. 21.

training colleges geography has found for some years a secure position, for the subject has always been taught under various forms in our elementary schools.

In the secondary schools geography now finds a place both in the Leaving and the Higher Certificates.[1] But this has not come without a struggle. Modern views on the subject have but recently filtered into the schools, and in many cases opposition has hampered its development. The official encouragement, for example, given to the secondary schools to pursue advanced courses, led at the outset to composite courses made up of a few subjects such as classics, mathematics, and modern studies to the exclusion of geography. It was not until some time afterwards that the subject of geography was given grudging acknowledgment by the Board of Education and a course in which geography had a due place was sanctioned. But the course has not yet won popular favour. In putting forward the claims of the subject to group recognition Sir Halford Mackinder recognized the importance of the inclusion in the course of subjects such as physics and mathematics, which would seem to provide training in exactness, and suggests the addition of history or botany as subordinate subjects.

A glance at the syllabus suggested for the Intermediate Degree Examinations of the London University will give some idea of the nature of the work now required. The course includes (1) a study in detail of physical geography, (2) the world divided into regions with (3) greater emphasis upon the main parts of North America, the monsoon lands, and Europe. Practical work with maps is regarded as essential. The Final Degree Course requires a sound knowledge of physical geography, including geology and and a study of the world with Europe treated in greater detail. Practical work including field mapping and the collection of climatic data is regarded as important.

At the University College, Aberystwyth, under Professor Fleure's direction, students are admitted if they have obtained a Higher School Certificate in geography or have completed the first year course in geology, which deals with the structural basis of geography. The degree course is as follows:

1. Introductory mathematical geography. Land and water distribution. Relief of continental land masses, long and short period movements in lithosphere and hydrosphere. The atmosphere and its movements, weather study.

2. Surveys of the equatorial and lighter tropical forests, the inter-tropical and extra-tropical grasslands, scrublands, and deserts, the sub-tropical, deciduous broad-leaved and coniferous forests, the tundras, mountain lands, tropical and extra-tropical coasts and islands, the great plains: transition zones. Special reference to climatic factors, vegetational characteristics, human activities.

3. The general and special position of the British Archipelago, structure, orography, and drainage; the British seas, climates and weather of Britain's regions, agricultural and manufacturing areas; industries, settlements, lines of communications.

[1] In 1929, for example, 65·8 per cent of the pupils taking the Leaving or First Certificate examination in our English Secondary Schools took Geography, and in the second examination Geography was taken by only 8·7 of the candidates. ("Education in 1929." B. of E. Cmd. 3545.)

4. North America—structure, relief, climate, vegetation, social and economic features.
5. North-west Europe—natural, political, and economic regions and relations.
6. The monsoon lands of south-east Asia.
7. Historical geography of commerce from the earliest times to the voyages of James Cook.
8. Map work. Ordnance survey and other sheet maps, map calculations, preparation of maps and block diagrams, weather charts, atlas maps.

Field and office work in various topographical surveying processes. Theory of map projections. Construction of map graticules.

Structural geography in relation to social and economic units.

Every candidate for a degree in geography must submit a study, including original maps, of an approved district or subject.

Students equipped with a sound knowledge of geographical data who have pursued courses similar to the above are now entering the teaching profession in increasing numbers as specialists. They are found mainly in the secondary and selective central schools and also in the senior schools. In training colleges, too, courses in geography are increasingly popular, and such combinations of subjects as English, geography, and biology find ready acceptance. Summer schools and refresher courses also give opportunities to the teachers to refresh their knowledge and keep in touch with modern methods.

But particularly in the case of geography is it essential that the teacher should have that wider knowledge of men and affairs which intercourse with other peoples alone can give. Tales of travel give information, but the knowledge gained by the traveller is centred around such foci as the interchange of trade, the exploration of a particular district, or the distribution of animal or plant life or disease, factors which, important as knowledge, have still to be related to the child's interests. Too often, however, the teacher in the past has culled his knowledge from books and lacked the freshness of outlook and knowledge derived from direct experience and observation. Largely in consequence of this, directors of education from the Dominions and geographers on the Continent have often criticized the inaccuracy of the facts placed before the children in their own and other countries. Not only should the modern teacher of geography make himself familiar, by visit and close inquiry, with various regions, but he should also know enough of at least one foreign language so that he can live the life of that people and enter into their point of view. The League of Nations Union offers considerable facilities for work of this nature through lectures, the arrangement of conferences, and of visits to Geneva for both pupil and teacher. Accurate knowledge and an international sympathy and outlook are the first essentials of the teacher's equipment. Other qualifications are more general in character. Thus the good teacher of geography should have acquired the habit of storytelling, and this implies imagination and the power to select. He should ever be on the look out for characteristic descriptions, such, for example, as are to be found in *Robinson Crusoe*, many of Kipling's books, or in *King Solomon's Mines*. His task is to help the children to an appreciation

of the geographical situation, to train them in the methods of simple inquiry and to the habit of understanding words and phrases—for each generation introduces a jargon into the literature of new subjects and geography is unfortunately no exception to the rule. The teacher should also have a fair acquaintance with the crafts, so that he may fashion models in a variety of materials and know how to handle them. He must also be skilled in the use of the blackboard, for the teacher who has skill in the ready use of chalks for sketch and diagram will be likely to maintain the interest of his class.[1] And, finally, the geography teacher as all other teachers must wander outside the confines of his subject. Literature, art, and the sciences are the product of man and thus subjects for the geographer. But they are life and must be experienced. The mind in contact with the best that has been thought and felt in the world is not in danger of becoming stale or indolent.[2]

Geography to-day claims its place as an independent subject taking toll as do others of those more closely allied to it. But the teacher will continually be reaching out beyond the confines of his subject, for he will find himself constantly in difficulties if he has to inform the inquiring child that he cannot explain events or answer questions since the knowledge behind belongs to the geologist or the meteorologist, to the biologist or the archæologist. Hence the wise teacher will always be selecting, for selection is the keynote to the successful teaching of geography. As in other subjects, the teacher must come before the geographer in both choice and treatment of material.

We give below a brief indication of those aspects of allied groups of knowledge which are generally regarded as specially important to the teacher of geography.

**Geology.**—The geologist devotes much thought to the construction of the geography of the past. As Mackinder has said, he is interpreting the past in the light of the present. So the geographer ought to appreciate those features of the present which serve as keys to unlock the past. The gravel banks of the shore pass into sands and in deeper waters into deposits of mud; farther out, where water is clear, we get accumulations of shell and remains of creatures with hard skeletons. So the geologist regards the horizontal passage of limestone to clay and onwards to sands and gravel as indications of an approach to shore, the thickening of strata as nearing the source of supply, and he checks his conclusions by noticing if the fossils in the beds are such as to-day live in fresh water or under estuarine or deep-water conditions. So, too, he has formulated (i) a law of superposition—limestone succeeded by clays and sands to him means a change from deep water to shallow water conditions; (ii) he has found

[1] For guidance in particular lessons the teacher would do well to refer to *The Geography Lesson* by Professor Fawcett, published by Arnold.

[2] All teachers of geography in this country should belong to the Geographical Association, a body composed for the most part of teachers. Its organ *Geography* is published four times a year and is concerned primarily with the problems which confront the modern teacher of geography.

indications of unrepresented periods of time by the fact that horizontal beds lie over the upturned edges of older strata, which must imply folding and much destruction during the intervening period.[1] He makes careful records of deposits due to various phases of ice action which have brought about great changes in physical features, hiding some entirely as in Lancashire and rearranging stream systems like the Severn and Dee. Many a case of so-called river capture is not true capture but arises from rearrangement when streams began to flow when the ice sheet retreated.

Without some geological knowledge it is difficult to understand fully the technical terms in use, and to interpret many of the features of the landscape. Thus, from the evidence of the rocks, it is known that drowned valleys, shown in the plate facing p. 96, are due to subsidence since man settled in Britain. The plate facing p. 112 shows the effect of hard bands in resisting the attacks of the sea, whereas the soft layers are worn away and inlets formed. The lower half of the same plate indicates growth of land seawards through the deposition of gravel banks along the coast. The plate facing p. 128, a photograph of Arthur's Seat, Edinburgh, shows how hard igneous rocks—the two low hills are the stumps of ancient volcanoes—resist agents of denudation acting over long periods of time, and still stand out as high land. On the same plate is a typical upland valley, where the volume of water during flood periods and the gradient lead to rapid downward cutting and the formation of a V valley.

Lastly, reference may be made to the revolution in opinion as to the state of the interior of the earth, and in relation thereto the present distribution of land masses as well as the causes of earthquakes and volcanoes. Formerly it was regarded as certain that the interior was liquid—now the reverse. That the centre is largely metallic is still accepted. But many authorities incline to the view that volcanoes and earthquakes and land movements are features of the upper crust and caused by changes which Joly and others suggest may be due to radioactivity.[2]

**Meteorology.**—In meteorology the geographer cannot afford to be ignorant of the modern work on conditions in the upper air and on the structure of cyclones, especially in connexion with the Polar front theory. The climate of the country is largely dependent upon cyclonic conditions.[3]

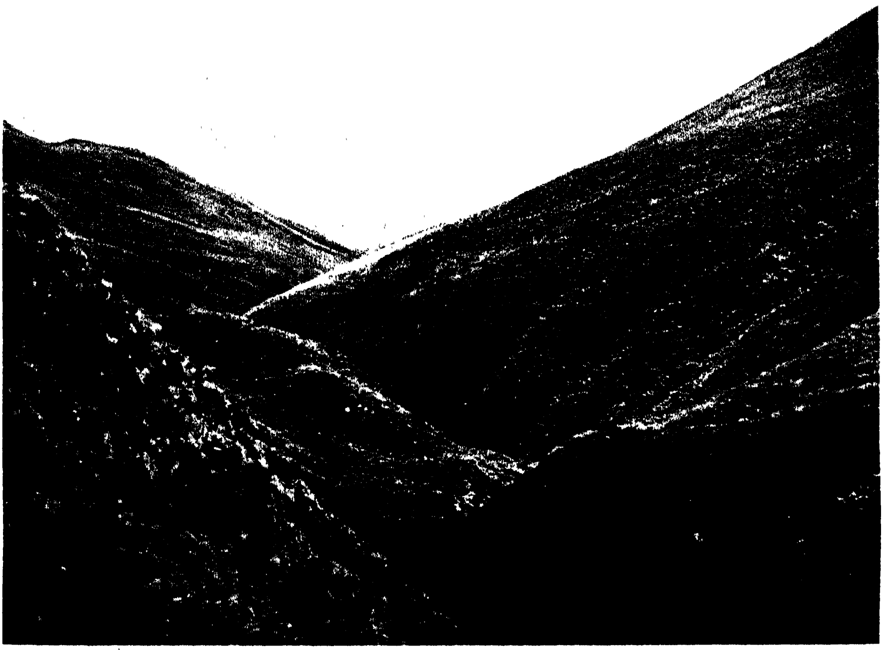
**Biology.**—Biology may also contribute much, as, for example, the work in plant ecology and, in zoology, distribution of animals and the development of new varieties. It is interesting to see how the results of modern observation and experiment are tending to carry us back to the older explanations which assert that change of habit is the cause of

[1] As an excellent example of the connexion between the two subjects see Watts, *Charnwood Forest: a Triassic Landscape* (*Geographical Journal*, 1903).

[2] An excellent summary of this aspect of the subject is given in J. W. Gregory's *Making of the Earth* (Williams and Norgate). Wegener's theory of the origin of continents now appears in many of the larger textbooks, so need not be dealt with here.

[3] Brooks, *The Weather*, in Benn's 2*s*. 6*d*. series, gives a clear, if simple, explanation of the phenomenon.

Worn Mountain—Arthur's Seat



evolution, or, as Professor MacBride puts it, " Verily storm and stress are the mothers of evolution ".

In the working out of life histories the doctrine of " the host " has come to the front—the practice of certain lowly organisms, plant and animal, to spend one part of life under one set of conditions and one in another. This is seen best in relation to pests and diseases. In a volume of *Suggestions to Teachers* issued by the medical branch of the Board of Education, it was proposed under geography that a study should be made of health maps and vital statistics, and special mention was made of certain pests, such as the hook-worm which causes so much degeneracy among Europeans living in the tropics.

**Archæology.**—The field of archæology has grown closer and closer to geography. The names of Fleure and Peake are prominent in both. Nor can archæology be separated from ethnology. The geographer has but to glance at any published list to find a large number of works. Fleure's *Races of Mankind*, Marett's *Man in the Making*, Fallaize's *Origin of Civilization*, Peake's *Origins of Agriculture*, Massingham's *Pre-Roman Britain*, and many others all showing that geographical conditions stood out prominently in determining both the evolution of early man and differentiation in his habits and customs.

**Books.**—No subject has seen so many new books published since the war as geography, and it is difficult to choose between them. But we would urge the advisability of picking books which serve different purposes. Books for reference should be very full; those for ordinary class work are often too full of detail without sufficient guidance as to what is essential and what is merely interesting or serving as illustration. There is much to be said for the French method of a smaller book with very clear summaries ready to be committed to memory. It is doubtful if notebooks, however well kept, do the same kind of work.

We have made no attempt to prepare a list of books useful for reference. Many authorities now print such lists, and fresh books are constantly appearing. It is far more important that the teacher should know every book in the reference library, and that he should guide his pupils' reading to the particular portions which bear on the subject in hand. Not only are text and reference books needed but the school library should, if it does not possess these, have access to books on general topics which bear upon geographical work. Here the local libraries and, in the rural areas, the county libraries should be pressed into service. The newspaper also should prove helpful if properly used. Foreign affairs and events now gain more space, and the training in reading what is essential may well help to divert attention from the mere sensationalism which too often is the main attraction of the paper.

# FRENCH

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# FRENCH

## CHAPTER I

## Introduction

In the Report of the Consultative Committee of the Board of Education on *The Education of the Adolescent*, a few pages (210–4) are devoted to the teaching of a modern foreign language in post-primary schools. And French is taken as the chief example.

"Eleven," we are told, "is a suitable age at which to begin the study of a modern foreign language." The following are given among the reasons. "The child's perceptions are acute, his vocal organs are still flexible, and he is comparatively free from that morbid dread of ridicule which may impede the progress of older pupils." Such reasons as these, however, would apply with still greater force as arguments for beginning earlier. The Hon. Bertrand Russell, in his book *On Education*,[1] advocates beginning in early childhood. "In childhood," he writes, "it is possible to learn to speak a modern language perfectly, which can never be achieved in later years; there are therefore strong grounds for teaching languages at an early age, if at all." And he goes on to meet objections. "Some people," he says, "seem to fear that knowledge of one's own language suffers if others are learnt too soon. I do not believe this. Tolstoy and Turgenev were quite competent in Russian, though they learnt English, French, and German in infancy. Gibbon could write in French as easily as in English, but this did not spoil his English style." Every school for children, therefore, according to this writer, ought to have a French mistress.

To those who, considering Russell's examples as exceptional, still express fear that the acquisition of English will be retarded in most ordinary cases, we may cite the bilingual education which is found in many parts of Wales. We may even maintain that the knowledge of a foreign language positively aids in the understanding of one's mother tongue. "What do they know of England, who only England know?" asks Kipling. The same challenge may be made with respect to the language of England.

[1] Published by George Allen & Unwin, Ltd. (1926).

But we must accept things as we find them, and make the best of them. In central schools and in senior schools, we receive pupils who have learnt no French in the primary course. The age of 11+ is thus forced upon us. We hope to keep these pupils for at least four years. And we propose to give them instruction in French for at least five periods of forty minutes each per week. Unless we can give this amount of time, we shall be trifling with the language. The London County Council, indeed, requires a minimum of four hours of instruction per week. This is by no means excessive.

### Aims of French Teaching

What do we hope to achieve by the end of the course? The Consultative Committee of the Board of Education consider that we should aim at making the pupils able:

"(i) To pronounce French in a way not displeasing to their hearers;
"(ii) To understand spoken French;
"(iii) To speak intelligently on subjects within the range of their experience;
"(iv) To understand the meaning of the printed language;
"(v) To write freely if not accurately in French;
"(vi) To realize that a knowledge of French will give them the key to a famous literature."

With most of these aims we may agree. But there are two of them to which we feel bound to take exception, (i) and (v).

**Fluency.**—To begin with (v), we may at once affirm that "little and good" should rather be our motto. To quote Dr. Hedgcock,[1] "What is required is not quantity nor brilliance; it is French." And again: "Of course, given correctness, fullness of matter and good style will gain the highest marks; but correctness and clearness come first."

Even in English composition, it is perhaps unwise to put freedom before accuracy of expression. It is true that we sometimes give good marks to an essay which is rich in ideas, though containing many mistakes in spelling and grammar. And it is advisable that the teacher who is inclined to condemn and "mark down" all compositions which contain a number of inaccuracies of expression should be required to give a certain proportion of the marks for "matter" quite apart from the other features of the work done. But in learning a foreign language—at any rate during the first few years—we are not so much occupied with new ideas as with new forms of expression. In the case of French, the language is such a delicate instrument, and so dependent, almost at every step, on grammar, that any encouragement of freedom at the expense of accuracy will be disastrous; it will result in the production of such rubbish as would cause any Frenchman of ordinary culture to shudder with

[1] *Practical French Teaching* (published by Pitman), p. 120.

disgust. We must insist that sins of commission are worse than sins of omission.

To write with any profit, whether to oneself or to one's reader, on any subject requires much preparation. It is not sufficient to know the essentials of French grammar and to have a good vocabulary. Gouin tells us that after learning many thousands of words, he found himself as helpless as at the start. We must know *the* vocabulary and *the* forms of expression which are actually employed in the case in point. To rattle on, using *our* vocabulary and *our* forms of expression, even supposing that we break no rules of grammar, will most probably result in unintelligible gibberish. Even the mature student of French hesitates to plunge into a subject on which he has not been reading recently and in which he is not familiar with the usual modes of expression.

**Standard at End of Course.**—What, then, can we expect of our pupils in the way of composition at the end of their four years? They should certainly be competent to write a letter dealing with the ordinary affairs of life or simple business transactions. To be able to do this, they will have read and studied a number of good examples, assimilating not merely the necessary vocabulary, but a large number of the phrases usually employed. It is necessary to bear in mind that, at any rate for ordinary writers, and especially when dealing with a foreign language, composition is not a new creation *de fond en comble;* it is rather a selection and rearrangement, to suit the needs of our special subject, of phrases which have already been used many times by previous writers.

What does the advanced student do when composing? He has by his side a large French dictionary, such as the *Larousse Universel en 2 volumes*,[1] or the *Dictionnaire Général de la Langue Française* par Hatzfeld, Darmesteter et Thomas,[2] and, whenever he is in doubt about the use of a word or a phrase, he turns up the word or looks for the phrase, or a similar one, in places where he is likely to find it. He examines carefully all the quotations given, and comes to a definite conclusion as to how and when the word or phrase has been used in the past.

And even the fairly advanced student will have recourse to a large French-English and English-French dictionary, such as that of Cassell, in which he will find a number of sentences or phrases to illustrate the use of each word. Thus, if he wishes to express in French, *I want to retire*, he may be tempted to write *Je veux retirer.* But let us hope that his knowledge of *tirer* as a transitive verb will suggest to him that *retirer* may also be used only in a transitive way. If so, he will use his dictionary, and hit upon some such sentence as *Je veux me retirer des affaires* or *Je veux prendre ma retraite.* The more he searches among likely words, the more alternative expressions he will find. But he must not dare to make up an alternative of his own. If he does, he will probably produce something which is either meaningless or misleading.

But the boy in a central school, except perhaps in his Fourth Year,

[1] Librairie Larousse, Paris. [2] Delagrave, Paris.

will usually have at hand nothing more than a pocket dictionary which gives little beyond the rough equivalent of each word in the other language. For him, therefore, much more than for the mature student, it is necessary to keep close to the lines of previous reading.

In addition to letters, simple descriptions and narrations can and should be expected. But, once again, these must be based on previous reading. Thus, when the pupil has read a few short biographies in French, such as those of Napoleon, Molière, and Gambetta, he may himself attempt similar, though somewhat simpler, accounts of Wellington, Shakespeare, and Gladstone. The guiding principle should be that of imitation of good models. Where a good Fourth Year, or a Fifth Year, exists, a special book may be worked through on these lines, such as *Free Composition and Essay Writing in French* by Pratt and Philibert.[1]

We have had a glance at the end of our task. Let us now hark back to the beginning, for our criticism of the first aim of the Consultative Committee will involve us in the initial stages.

**The Teacher.**—But first of the teacher. We must, of course, assume that he (or she) is a disciplinarian, and has had some experience of teaching in general. We must also assume that the teacher has learnt French, at least up to the stage of doing well, possibly gaining distinction, at one or other of the various Higher Certificate examinations. And, thirdly, we must postulate a knowledge of phonetics, French and English, with a definite interest in them.

We may dismiss from our minds the idea of a native teacher, as suggested by the Hon. Bertrand Russell. Such a teacher is necessary only when children "imbibe" French in early childhood, in much the same way as they learn the fundamentals of their mother tongue. But at 11+, the problem is a totally different one. Whether we like it or not, the fact is that our pupils have now acquired fixed habits of speech. If they are to learn to speak French, a new set of habits must be acquired, side by side with the old ones. And the person best able to teach them is one who has already made the acquisition. The French person has grown up in an atmosphere of French speech, and has acquired the necessary movements of the vocal organs all unconsciously. An interesting example of this truth has been given by M. Zünd-Burguet, a well-known French phonetician. Selecting a young French barrister who spoke excellent French, the phonetician asked him: "What do you do when you pronounce *pa*?" The young man pronounced the word several times and then replied, "I shut my mouth, and then I open it." "And what do you do when you say *ba*?" was the next question. Again a few trials, and the barrister answered, "The same thing; I shut my mouth, and then I open it." "And what for *ma*?" was the third question. Once more the lawyer made several trials, and then declared, "Why, it's the same thing again; I shut my mouth, and then I open it." But different results must have different causes, though the young man was not aware of them.

[1] Published by Dent & Sons.

A few French teachers of French have studied the phonetics of their own language, and can be of great help to English learners, but the majority of native teachers have never done so. They have neither knowledge of, nor interest in, the mechanism of what they have acquired, apparently without effort, and ignorant of the immense gulf which separates them from their pupils, they remain satisfied with the rough English approximations which these give in their efforts to imitate. But are we to rest satisfied with such results? Is it enough that our pupils should learn "to pronounce French in a way not displeasing to their hearers"?

In the first place, it should be noted that the Committee's statement is ambiguous. If the "hearers" are English with poor phonetic training, the rough English approximations which would grate on the ears of a Frenchman may be more pleasing to them than correct French speech would be. It is said that during the Great War Mr. Lloyd George liked the French of a certain English member of his entourage because it was the only French he could readily understand. Is this the sort of thing that the Consultative Committee have in mind? Scarcely would they dare to affirm it. What they probably mean to assert is that it is practically impossible to teach our pupils absolutely correct French speech, such, for instance, as that which is spoken by the well-educated people of Paris, and that therefore we must rest satisfied with a tolerable approximation to it.

Now the writer believes that this is a wrong attitude to assume. It is responsible for the unpleasant fact that most English people, in spite of four or more years of instruction in French, are distinctly uncomfortable in the atmosphere of oral French. They can read, they tell us, and quite fluently; but, for some reason or other, they have neglected the oral side of the language. And, as a consequence, they profit very little from a short stay in France. By the time they have got their ears attuned, it is time to go back. The weakness is not confined to the products of secondary education. It is equally marked among university students. There are graduates with First Class Honours in French who could not argue a point out with a French railway porter. They have spent years in the study of French literature and of historical French grammar; but in the language itself, they are still beginners. For it is important to remember that the language in its essence consists of sounds made by the tongue (in conjunction with the other organs of speech). The very words *language* and *tongue* are sufficiently indicative of this truth. Written forms are only a substitute for sounds; and, whether we will or not, we must interpret them by giving *some* sounds. How foolish, then, to begin and to continue with wrong ones, so that, though we can read, we cannot speak properly or understand those who do!

CHAPTER II

# Importance of Correct Pronunciation and Diction

As the years pass, more and more opportunities of hearing the language, i.e. of getting in touch with the fundamental form of it, are presenting themselves. Even for those who cannot go to France, there are many facilities. Not only do we have wireless talks by the B.B.C., but those who have valve sets—and their number is daily increasing—can, by picking up Continental stations, listen-in to some French many times in the week. A large number of excellent gramophone records have also been produced. And, as we shall see more clearly later, these are of immense value in acquiring a knowledge of spoken French. But their full value cannot be appreciated by those whose ears and tongues have not been trained by a practical course in pronunciation. For, with the exception of babies—who have formed no speech habits—and of a few (a very few!) specially gifted individuals, who seem to be able to imitate almost any sounds spontaneously, it is not possible to acquire the vowels and consonants of a language like French merely by listening to them and trying to reproduce them. The speech habits which we form as we grow up in the atmosphere of our mother tongue are, for the great majority of us, an insuperable barrier to the acquirement of new habits, unless we receive definite instructions as to what are the new things to be done, *and unless we repeatedly and unfailingly practise the doing of them.*

## Introduction of Phonetics

It is the stipulation which we have just italicized which is the stumbling block. More than thirty years ago, the study of phonetics was introduced into our schools as an aid to the teaching of correct pronunciation in modern languages—Professor Ripman, later Chief Inspector of Schools for London University, and Professor Baker of Sheffield University, being among the most active pioneers. Almost all schools which aspire to be "up-to-date" affect to give some instruction in the subject, the alphabet of the Association Phonétique Internationale [1] being more or less definitely employed. And there is little doubt that much improvement has been effected. But what has been achieved is far short of what Ripman and his enthusiastic disciples expected. The causes of this comparative failure are numerous. Perhaps the chief is that, although oral tests have been introduced as part of most examinations, they are regarded as less important than the written tests. In many cases the examiners, who are English, cannot speak correct French themselves. And even where Frenchmen are employed, these are often without that phonetic training which

[1] For membership, with receipt of the quarterly review, *Le Maître Phonétique*, send 12*s*. to Professor Daniel Jones, University College, London, W.C. 1.

would enable them to judge with nicety of the degree of approximation to correct pronunciation. Above all, the marks given for the oral side are quite out of proportion to those given for written work. Now the effort necessary to acquire and fix all the new habits of pronunciation is so great that it is not likely to be carried through in most schools unless there is a strong incentive. This incentive being lacking in the majority of cases, the labour of forming the new habits is frequently shirked, either in whole, or in part. In the latter case, a few lessons are given on the sounds and the manner of their formation, a few exercises are half-heartedly attempted, and the matter is dropped like a hot coal, both teacher and pupils reverting to the rough English approximations which, given their existing speech habits, are so much easier to produce.

"We want to get on with the *French*," is the excuse of some teachers. But what *is* French, fundamentally, but a system of significant sounds? Such schools as this have really no right to put French on their timetables and in their prospectuses. If the truth were told, what they teach should be described as *written French* with *oral English*. For the sounds made by the pupils are almost, if not entirely, English ones.

It is somewhat surprising, but it is nevertheless true, that there are authorities who attempt to justify this practice. Dr. Hedgcock, whom we have quoted with approval on the question of composition, writes as follows:[1] "Do not begin with pronunciation and phonetics. Nothing is more discouraging and disappointing for the beginner than to discover that, after having promised to teach him French, you intend first of all and for some time to teach him sounds." The only answer to make to this is that French *is* a new set of sounds, and that whether the pupil is discouraged and disappointed or not, we must tell him the truth. We must not deceive him. If we do, the discouragement and disappointment will come later, when he goes to France, or hears French on the wireless, and discovers that it is not the French he learnt at school.

### Intonation

In contrast to Dr. Hedgcock's statement, it is interesting to cite the recommendations of two authorities who are not satisfied even with correct pronunciation from the beginning. There is also the music of speech to be considered. It is far easier to sing in a foreign language than to speak or recite. In the former case, correct pronunciation is the only new thing that is required; the music is prescribed for us by the composer of the song. But in the latter case, we have to make our own music. This more irregular music of speech is known as *intonation*. It is different in different languages. And although it may vary in a given language with different people, there are certain definite laws for each tongue which must be obeyed. These are so important that disobedience to them is as fatal as faulty pronunciation. Thus, if I pronounce the French sentence, *Avez-vous une bonne chambre libre?* with absolutely

[1] *Op. cit.*, p. 49.

correct vowels and consonants, but with the intonation of the corresponding English, *Have you a good room free?* even though I have dressed myself to look as much like a Frenchman as possible, I shall at once be recognized as a foreigner. Without going into detail, we may say in passing that the chief distinguishing features of the English intonation in the sentence quoted are a somewhat high pitch at the beginning and a considerable drop (with some emphasis) on the word *room*. Now Messrs. Klinghardt and Fourmestraux, in their book entitled *French Intonation Exercises*,[1] recommend careful attention from the beginning to intonation as well as to pronunciation. They write as follows: "If the teacher reads and speaks French with the intonation peculiar to his native town or country, if he is not even aware of the differences that exist between the melody of his native language and that of French, he is actually deceiving his pupils. They have a right to hear and be taught to intone the foreign language correctly. They can learn to do this as easily as they learned the intonation of their native tongue. It is fundamentally a matter of habit. Therefore in the beginner's class the teacher should speak and read all French words and sentences with the characteristic French melody, and should require his pupils to repeat them in the same manner. Simultaneous practice of the exercises is to be recommended. . . ."

### Correct Pronunciation from Beginning

The great reason for this recommendation, as well as for the insistence on absolutely correct sounds from the very beginning, and without any backsliding, is to be found in the nature of habit. It is unfortunate that few teachers of language have studied the psychology which bears on their work. Let us, however, quote a few passages from James' famous chapter on Habit.[2] "'Habit a second nature! Habit is ten times nature,' the Duke of Wellington is said to have exclaimed; and the degree to which this is true no one can probably appreciate as well as one who is a veteran soldier himself. The daily drill and the years of discipline end by fashioning a man completely over again, as to most of the possibilities of his conduct."

Now it is this automatic action, independent of conscious control, which we must secure, if our phonetic training is to be of lasting value. It is not sufficient that we and our pupils know what to do in order to produce the new sounds. That is only the starting-point. When we are speaking a language, there is no time to think of the production of each of the innumerable sounds, as it is produced. As a matter of fact, our attention is usually occupied with the matter, with the phrasing or construction of the sentence as a whole, and perhaps with the choice of some particular word. Unless the correct sounds come automatically, good pronunciation will be impossible. Some schools, in their anxiety to make a good start, devote the whole of the first term to phonetics. Then, having, as they think, "laid the foundation", they go on to ordinary French lessons. These schools, consciously or unconsciously, are obeying the first of the

[1] Published by Heffer & Sons, Cambridge. [2] *Principles of Psychology*, Vol. I.

two great maxims quoted by James, viz. "that in the acquisition of a new habit, or the leaving off of an old one, we must take care to launch ourselves with as strong an initiative as possible".

But the metaphor of a foundation is misleading. It suggests something which is fixed, and which needs no further attention. Unfortunately, however, there are the English habits of speech which are continually being exercised day by day, and which will influence the new French habits, unless these are preserved by continued and faultless repetition. We must remind ourselves of the second maxim quoted by James: "Never suffer an exception to occur till the new habit is securely rooted in your life. Each lapse is like the letting fall of a ball of string which one is carefully winding up; a single slip undoes more than a great many turns will wind again. Continuity of training is the great means of making the nervous system act infallibly right."

The ideal to aim at is that the pupil should "switch on" a new system of speech habits directly he embarks on French. This is no impossible thing, once the habits have been started. It involves much the same mental process as that which takes place when a person reads the key signature at the beginning of a piece of music and immediately proceeds to play the piece, automatically picking out the necessary sharps or flats, without any further thought of the key signature. Of course, there must be definite thought at the outset. And, if the necessary time is not given for this, mistakes may occur; so with French. Even a person who can speak French correctly may find himself tripping, if he hurriedly interpolates a French quotation in the middle of an English speech; for there will be scarcely time to switch over to the new system of habits. But if such a person makes a slight pause before his quotation, giving himself time to "change over", he will probably give the quotation with perfection. With children, however, whose new speech habits are not yet firmly fixed, it is often advisable to give some considerable time for switching over, and to encourage the process by a definite exercise which will awaken the new system. Thus, for certain French vowels the lips have to be more definitely and more forcibly pushed forward and rounded than in English. This is the case with the vowel represented by "y" in the alphabet of the Association Phonétique Internationale, and usually designated by the letter *u* in ordinary spelling. It is a sound not occurring in English, being formed with the tongue in the position for *ee* (as in *see*) and the lips rounded as for *oo* (in *too*, for instance), but more forcibly. Now, in making their first attempts to get this vowel, the pupils may start with *ee* and, keeping the tongue still, may round and push forward their lips. When they have become accustomed to this new combination, they will, of course, learn to produce it straight away; and it must, of course, be always produced straight off when one is speaking French. But the rounding and unrounding of the lips from the *ee* position of the tongue is good not only as ensuring a good *y*, but as a preliminary exercise to brace the lips for the additional effort necessary in French, and to impress

upon the children the fact that they are "switching over". There are many other similar exercises which may be given,[1] and on which the changes may be rung in different lessons. But space prevents further elaboration here.

It is highly important to decide with certainty whether this insistence on absolutely correct pronunciation from the beginning is the best course. Dr. Hedgcock tells us: "Pronunciation, like all the other parts of our language study, must improve with time, although teachers are quite right to set a high standard from the start."[2] There is apparently some amount of contradiction between the second clause of this sentence and the first. But Dr. Hedgcock's meaning is fairly obvious. He believes in starting by accepting rough English approximations to the French sounds, and hoping for improvement as progress is made in "the other parts of our language study".

But the two things—pronunciation on the one hand and "the other parts" on the other—are not on all fours. In pronunciation we are continually attempting to produce the *same* sounds. In the other parts of our language study we are continually making *new* acquisitions; we come across new words (containing the same sounds in different order) with new meanings which we have to associate with those words. There is, of course, continual progress here. But the only improvement we can admit in pronunciation is one of facility and readiness in doing the same things—due to the fixing of our good habits. Whereas the child has to begin by painfully and with full consciousness following our instructions, he gradually forms a habit which enables him to go on doing the same things unconsciously. There is no reason why his earlier attempts, though more laboured and requiring a great amount of attention, should be inferior in their results to his later ones.

If, however, one is content to start with English approximations to the French sounds, the chances are that one will continue with them. For, whether one likes it or not, *habits are formed on the basis of what one actually does*, not on the basis of what one hopes to do in the future. Once formed, indeed, they will be extremely difficult to eradicate.

**Accentuation.**—There is yet another matter, closely connected with pronunciation, in which this recommendation to begin as we hope to go on is urgent—that of accentuation. In French there is not to be found that strong emphasis on one of the syllables of a word together with scarcely a touch on some of the other syllables. Take as examples the two cognate words *literature* and *littérature*. In the first (English) word, there is a great deal of force on the first syllable, so little on the second that it is continually in danger of disappearing as a distinct syllable,[3] and comparatively little on the other two. In the corresponding French word all four syllables (the final *e*, of course, not being sounded) have equal

[1] See, for instance, *Elements of French Pronunciation and Diction*, by B. Dumville (Dent), pp. 57–62. [2] *Op. cit.*, p. 53.

[3] As a matter of fact, in all but the most punctilious speech it does drop out, and we get 'litɹətʃə (see later for explanation of symbols).

stress, with the exception that the last has a slight addition of force. This rule applies to all long words, and also to all little groups of shorter words which, being pronounced in immediate succession, are equivalent in sound to a long word. Thus, in the sentence *Il n'en a plus*, all four syllables are equivalent in force except the last, which once again has a little more than the others. There are some rhetorical accents which, however, we cannot consider here. But in general, what we have said is the basis of French accentuation. Apart from occasional rhetorical accents, the acoustic effect of spoken French may be likened to a string of equal-sized beads with a slightly larger one at the end of each little group which may be cut off by a pause before proceeding to the next.

Now, it is important that the pupils should be accustomed to this changed accentuation *from the first.* And words which are similar in French and in English, like the pair we have just cited, should receive special attention, so that the English method of accentuation shall not have a chance of creeping into French. In the early stages, the pupils can be allowed to tap uniformly on the desks while they are pronouncing French (with a slight increase of force before each pause)—one tap for each syllable. This will help them to acquire the chief characteristic of French accentuation. Here again, unless attention is given to the matter at the start, wrong habits will begin to be formed, and will tend to persist in spite of later efforts to eradicate them.

If further argument is necessary to enforce the importance of beginning with correct speech, we may cite the similar case of learning to play the violin. The teacher does not allow his pupil to begin by holding violin and bow in any convenient position, hoping to improve matters later on. He knows that good habits must be formed from the start. And, trying as it may be to his pupil,—who probably desires to get on and play some notes as soon as possible—he will not let him proceed until he has assumed the right position. So with the French sounds, we must insist on absolute correctness at the start. There will be improvement as we proceed. It will not, however, be improvement in the sounds, but in the facility with which they are produced, as the habits get fixed. What was at first a laboriously conscious business will gradually become an easy and almost unconscious process.

Dr. Hedgcock tells us: " It is not possible to give your pupils a perfect pronunciation at once and before they have anything to say." [1] Let us take him at his word! It is possible, however, to give our pupils a perfect pronunciation directly they have anything to say. *And that may be in the very first lesson.* In another place, speaking of this first lesson, Dr. Hedgcock says: " Let him (i.e. the pupil) have the immediate satisfaction of learning some words; teach him how to say a few phrases in the language before you pass to the analysis of sounds." [2] What Dr. Hedgcock means seems to be that we are to begin with a little " French " pronounced with English approximations to the French sounds. If, however, by telling us

[1] *Op. cit.*, p. 53. [2] *Op. cit.*, p. 49.

to " teach him how to say a few phrases in the language ", he means that we are to teach him real French, then there is no difference between Dr. Hedgcock's advice and that given here. But his subsequent clause, " before you pass to the analysis of sounds ", and his previous advice, " Do not begin with pronunciation ", indicate that he is not advocating correct French from the start.

As to " passing to the analysis of sounds ", it is important to bear in mind that phonetics should not be taught to the children *ad hoc*. By all means let the teacher study phonetics. He should have studied the phonetics of both English and French, for he should have a thorough knowledge both of the children's present habits of speech and of the new ones which they are to acquire. He, of course, will have occupied himself with the analysis of sounds, and still more with the manner of their formation. But in his teaching of French he will *use* his knowledge of phonetics, not inflict it on the children. In general, he will tell the children what to do with their tongues and lips; and only in so far as it is necessary in guiding them to correct speech will he deal with phonetics as such. If Dr. Hedgcock has more than this in mind, then he is advocating more than we advise. We scarcely think that this is the case; for, in another place, he says: " Pupils do not come to school to learn phonetics; and that is their own strong opinion." This statement we can accept. But we must once again assert that pupils come to school to learn *French*, that French is essentially a system of *sounds*, and that we have failed in our duty if our ex-pupils when they go abroad, or when they listen to French on the wireless, regretfully exclaim that what they hear is not the " French " they learned at school.

It is quite a laudable ambition that the child should go home to his mother after his first French lesson able to repeat to her some French which he has learnt, but we insist that it shall be French pronounced as such. With the child who goes home after the first so-called French lesson to tell his mother that they have not had French at all, but phonetics, we heartily sympathize. And the author is reminded of the first French lesson which he received as a boy of nine. The teacher was a Frenchman, and the pupil had high expectations. But these were crushed when the book handed to the young aspirant turned out to be a French *Grammar*. Now phonetics may be roughly styled the " grammar " of words considered merely as sounds, grammar proper being the science of words considered as significant members of sentences. To begin with either of these grammars is a great mistake. It is like beginning cricket by studying the laws of the game. It is far better to plunge *in medias res*, to come into contact with concrete examples of the thing, and to leave any attempt to understand the whole business until later. Observe, however, that even in cricket, when we put a bat into the boy's hands (provided, of course, that he is not a baby, but a serious aspirant to play the game) we show him at once how to hold it, and insist on the necessity of playing " with a straight bat ", knowing full well that the tyro is at once beginning to form habits.

## French and English Sounds

Let us come now to the consideration of how we shall begin, ensuring (1) that the pupils learn some French and (2) that it is *correct* French.

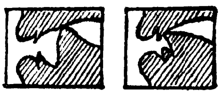
French consists of some sounds which are quite different from any English sounds, and many others which are more or less similar to English ones (and which are often represented by the same letters). It is fairly obvious that, acting on the principle of proceeding from the known to the unknown, we should not begin by overwhelming the child with a number of totally new sounds. Further, it is advisable, as far as possible, to deal with one sound at a time. And lastly, we shall do well to attack the vowels first, since these are the sounds which stand out most prominently, and give the chief characteristics to words.

Another preliminary consideration requires attention. Where French sounds are similar to English ones, are we to be satisfied with the English ones in French, or are we to insist on the finest possible differences? There are a few cases in which the difference is negligible. The French *s*, for instance, is practically the same as the English *s*, the only difference being that the former is a little more forcible than the latter. The French *m* is also almost identical with the English *m*, though in this case the former is usually held on a little longer than the latter, especially where there is emphasis. In such cases as these, it would be somewhat absurd to attempt to make distinctions. But in most cases, even though the difference appears slight, it is by far the best course to recognize it, and to see that the French sound is correctly made. If we begin by allowing one English approximation to be used instead of a French sound, there is no telling where we shall end. There is no reason, indeed, why we should not go on and allow English approximations for all the French sounds.

" *Who aimeth at the sky shoots higher far*
*Than he who means a tree.*"

If we insist on absolutely correct French in every particular, we shall reach a far higher degree of excellence than by resting satisfied with something near what is wanted.

**Consonant t.**—Take the consonant *t*, for example. In French, the tongue touches for this sound just behind the top teeth. In English *t*, the tongue touches a little farther back, and a more or less definite aspiration is heard. We might, indeed, to make the phonetic alphabet more strictly correct, represent the English *t* as $t^h$, the little letter $^h$ indicating the aspiration. Now one might argue that a little thing like this could pass unnoticed in French. But the point is that there are many other " little things like this ", and together they make a big difference. We must attend, therefore, to all these little things. " Trifles make perfection; but perfection is no trifle." Even this one $t^h$, if repeated a number of times in the same sentence, is sufficient to spoil the



whole character of the French. Thus, the French sentence, *Ton thé t'a-t-il ôté ta toux?* might be pronounced with every sound correct except for the English *t*, and this would completely spoil it from a French point of view.

**Consonant l.**—Another example of a sound which is commonly supposed to be the same in both languages, but which is not, is the consonant *l*. It is true that in both languages the chief characteristic of the consonant is the same—the point of the tongue is raised to touch the front part of the palate. But this being done, the rest of the tongue may assume different shapes, giving vowel-like modifications of the *l*.

$\text{l}^{\text{i}}$

$\text{l}^{\text{u}}$

Now, especially when this consonant comes after a vowel, the English usually raise the back of the tongue (causing a depression in the middle part), so that something of the vowel which is produced when the back of the tongue is raised can be heard. We might represent this variety by $\text{l}^{\text{u}}$. In French, on the other hand, the tongue curves downwards towards the back, being bunched up at the front just behind the part which touches the palate. This is roughly the same shape as that assumed by the tongue for *ee* (though there is no touching by the front of the tongue in the case of the vowel). This variety of *l* might be represented by $\text{l}^{\text{i}}$. It is very important that it should always be given in French. The children can learn to produce it by imitating the teacher. And, since *l* is a continuant, they can, while keeping the sound going, maintaining the point of the tongue in contact with the palate, move the rest of the tongue about and note the vowel-like changes. Once they have hit upon $\text{l}^{\text{i}}$, they must be induced to adhere to it, whenever they are speaking French.

### The First Lesson

And now for our first lesson. We satisfy Dr. Hedgcock's requirement by giving the children a piece of French. We ensure that the task of learning to speak it correctly is not too great by having one and the same vowel throughout, and this a vowel which is not very different from an English one. As for the consonants which occur, we arrange that, for the most part, they shall be those which are the same in both languages.

The vowel we take is what in English is often represented by *ee*. And starting with English, we give a sentence containing it a number of times —*Please leave me three free seats each week.*[1] The pupils will readily perceive that the vowel is the same throughout, but that it is represented differently in different words—by *ea*, *e*, and *ee*. We are going to learn an alphabet in which there is one letter only for each sound. It is the alphabet of the International Phonetic Association, and the letter chosen for this sound is "i". Not that this letter usually represents the sound in ordinary English spelling; but it does in French, and it was in France that this alphabet was made up. But the sound in French is not quite the same as in English.

[1] It will be observed that the vowel occurs *eight* times. This permits the sentence to be sung up and down the scale, as well as being said.

The French have a word which they write *si* and which means *if*; this word is pronounced something like our word *sea*. Now I am going to pronounce first the English word *sea* and then the French word *si*. The *s* will be the same in each case. I may tell you that you can't see how this sound is pronounced, because it is done inside the mouth. But you can see something of the way I pronounce *ee* (or i, as we shall now represent it). Watch my mouth carefully and tell me what you notice—*sea*, *si* (repeated a number of times).

The children will readily notice that in French the corners of the mouth are drawn back more forcibly. They will also notice a " sharper " quality in the sound, and they may be told that the tongue is held more tightly in position, pressing more forcibly against the inside of the lower teeth. Lastly they may notice that in the French word the vowel is a little shorter in duration than in the English one.

They may now be asked to pronounce the two words—*sea*, *si*—themselves. If each child is provided with a little mirror, he can hold it up before his face and watch himself making the required difference, thereby ensuring that he is doing the same as his teacher. The use of mirrors by the children is helpful, not only in examining the mouth to find, where possible, what is being done, but *in controlling movements*. It is astonishing what a number of children there are who think they are exactly imitating their teacher, when all the time they are very wide of the mark. The teacher may round and push forward his lips till the hole is about as big as just to let in the end of a pencil. He asks a pupil to do the same, and the latter may produce a hole big enough to let in the end of a round ruler. If the pupil, after watching the teacher's mouth, immediately proceeds to imitate with a mirror in front of him, he can scarcely make such a mistake.

But *à nos moutons!* The teacher tells the children that in French, as in English, we often find the same sound spelt in a number of different ways. Thus, there are four other words which are pronounced in exactly the same way as *si*. He now puts before the pupils the following sentence:

Si six scies scient six tiges, six mille six scies scient six mille six tiges
If six saws saw six stems, six thousand (and) six saws saw six thousand (and) six stems.

He reads the sentence several times, and calls attention to the meaning of each word. The children, under his direction, note that the French do not say " six thousand and six ", but leave out the *and*. Further, it is as well to tell them at once that *six* when said by itself is pronounced sis.

The teacher now proceeds to represent his pronunciation of the sentence in the alphabet of the Association Phonétique Internationale, as follows:

Si six scies scient six tiges, six mille six scies scient six mille six tiges.
Si si si si si tiːʒ, si mil si si si si mil si tiːʒ.

He explains that the sound given for the *g* in *tiges* (like that of the *s* in *leisure* in English) has no proper symbol in ordinary spelling, and that the

new letter ʒ has been chosen for it. He also explains that the colon (ː) after the i in this word is to indicate that the vowel is kept on a little longer than in the other words. The same colon would be necessary in representing the English word *sea* phonetically (siː).

If time permits in the first lesson, attention will be called to the *t* of *tiges*, the children being required to touch their palates with their tongues farther forward than in English. In a subsequent lesson, a specially constructed French sentence containing many examples of this consonant will be given for practice. But, as we have already noted, one should try to get perfect French from the start.

Similarly the word *mille* should receive careful attention. The French *l*, which we have already described (and designated as $l^{i}$), should be insisted on. But the vowel also requires attention. It is the *ea* of the English word *meal*, not the *i* of the English word *mill*, the only difference (besides the "sharpness" to which we have alluded) being that it is short in the French word (mil) but long in the English one (miːl).

The children must come to regard the vowel of the English word *mill* as a distinct vowel, which must never be given in French. If they are not warned from the beginning of this, we shall soon have them introducing this vowel in many French words, especially in *il*, which is, of course, a very common word. They must learn that *il* is pronounced more like the English word *eel* than the word *ill*, the chief difference in the vowel being that it is shorter in the French word *il* (il) than in the English word *eel* (iːl).

It is already obvious that the study of French pronunciation cannot be carried on without frequent reference to English sounds. Indeed, it involves a training in speech which may be made as valuable for the English of our scholars as for their French. We shall note more definitely the value for English later on. For the moment, we are concerned with the vowel in *ill* or in *it*, which we wish to banish from our pupils' French. In the ordinary texts of the Association Phonétique Internationale, this vowel was until recently represented in the same way as the vowel in *eel* or *eat* (by i), the only difference being that, as it is always short, its symbol had no colon after it. Latterly, however, the Association has come to use a separate symbol—ɪ, i.e. a capital I, but one taken from smaller type, so that it is no higher than the symbol i. It is advisable for the teacher to use this symbol, so that the difference between the vowel of *eat* and that of *it* may be definitely marked.

And, proceeding to deal with all the sounds of English, as well as with those of French, the teacher will give a sentence containing ɪ, such as: *Jim is with Tim in this big ditch.* He will give the phonetic transcript for this sentence as follows:

Jim is with Tim in this big ditch.
dʒɪm ɪz wɪð tɪm ɪn ðɪs bɪg dɪtʃ.

The pupils will be surprised to find that the first word begins with a d.

They will see that the two symbols ð and ʃ are necessary, because we have no proper letters in ordinary spelling to represent these sounds (which are *not* double consonants). The teacher may now go on to represent this sentence according to the way in which a French pupil, untrained in English sounds, would probably pronounce it, as follows:

dʒi·m iːz wiz ti·m in zis biːg di·tʃ.[1]

The French pupil will probably give z instead of ð in *with* and *this* because he has not been shown how to produce our *th*. This will be an object lesson to the children in the value of phonetic guidance. But the chief thing for the pupils to note is the vowel i, which is given in every case, because ɪ does not exist in French. The children will realize what a difference is made to our English sentence by the failure to produce ɪ. This should be another object lesson to them. They should understand that the introduction of ɪ into French is just as fatal to good pronunciation in that language.

It may not be possible in the first lesson to deal at length with the English vowel ɪ. But, in any case, the pupils should be warned off this vowel in the word *mille*, so that, when they go home to practise, they may not fall into the error which we have noted. The pupils should repeat the French sentence, *Si six scies* . . . a number of times simultaneously after the teacher. They should have copies of it with the translation and the phonetic transcript; and they should be given as home work the task of repeating it correctly, knowing the meaning of each word as they say it, until they can " rattle it off " without reference to the text. They should be warned that the object is *not* to learn it by heart, but to get more and more facility in saying it *correctly*. They must, indeed, be constantly on their guard against letting their pronunciation deteriorate as they repeat it. It certainly will deteriorate if they set out to learn the sentence by heart. But, if they go on practising long enough, they will not fail to get it by heart.

### The Second Lesson

The teacher will begin the second lesson by testing the pupils individually. There is no harm, however, in having a few more simultaneous repetitions first. This will not enable those who have shirked their home work to " rattle off " the sentence when called upon. Unless a pupil has done the work honestly, he will not be able to show the necessary facility and correctness. And the pupils will soon come to realize this as they go on to further sentences on further sounds. The teacher may frequently stop a pupil at any word in the sentence, and ask the meaning of it. Or he may himself begin to repeat the sentence and stop anywhere, asking the meaning of the last word. The chief object in view, of course, is correct pronunciation. But there is no reason why the meaning

[1] It might be explained that a vowel followed by one dot is kept on half as long as when followed by a colon.

of the French should not be learnt at the same time. We want, indeed, to get the children as soon as possible into the habit of saying and hearing French with *immediate* understanding of its significance. Perhaps this is the best place to pause in our description of actual lessons, in order to make the matter clear.

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CHAPTER III

# The Direct Method

In the old days, French was taught in schools on what we may call the *Translation Method.* The pupil learned the English equivalents for certain French words, and then proceeded to translate a suitable piece of French into English, going on finally to the reverse process of translating English into French. The results achieved were poor. English was always " getting in the way " of the French. When the pupil wanted to write or to say something in French, he framed an English sentence first and then attempted to translate it. Conversely, when reading or hearing French, he had to translate it into English before he could understand it. So, a little more than thirty years ago, the *Direct Method* was introduced into many schools. This was based on the way we learn our mother tongue, and the way bilingual children learn both the languages they acquire. Enthusiastic teachers tried to speak nothing but French from the beginning. The writer remembers giving a French lesson on " Direct " lines to an advanced class before one of His Majesty's Inspectors. Not a word of English was spoken throughout. But after the lesson, the Inspector confessed that he had been unable to follow. " I taught French in my young days at Rugby," he said, " but we used to translate, and there was no time to do that in your lesson."

Now it was soon found that a purely " Direct " method left many pupils very vague in their knowledge. This was only to be expected. We cannot, even with four hours a week, go through all the experiences of early childhood by which we have acquired our mother tongue. And, even if we had the time, we should not have the same circumstances. It is easy enough to point to the table and say, *Voilà la table*, or to open the door and say, *J'ouvre la porte.* But there are a large number of words the meaning of which cannot be directly demonstrated in this way. Even prepositions present a difficulty. The enthusiastic teacher would put a book on the table and say, *Le livre est* **sur** *la table.* He could then put it under the table and say, *Le livre est* **sous** *la table.* Raising it over the table, he could say, *Le livre est* **au-dessus de** *la table*, and so on. But the duller children would often be somewhat uncertain of the meaning in each case. Some teachers, therefore, would interpolate the English word to make sure that the pupils seized the right meaning. They

probably thought themselves traitors to the Method. In reality, they were acting very wisely. They were using what the pupil already knew to make the meaning of the French clear. It does not much matter how the meaning of a French word is made clear, so long as the word is understood and used " directly " as soon as possible. The immense number and infinite variety of experiences which have been necessary to get the meaning of certain English words make it practically impossible for us to acquire the corresponding French words in the same way. Think, for instance, of the means whereby we have learnt the meanings of *if*, *nevertheless*, *kindness*, and a host of other words. But when, on meeting the French word, we are told its English equivalent, we can fix the meaning in our minds at once, and, if we have already acquired the habit of thinking and speaking directly in French, we can proceed to use the French word without allowing the English word to obtrude itself excessively. In these matters, English must be a servant, not a master.

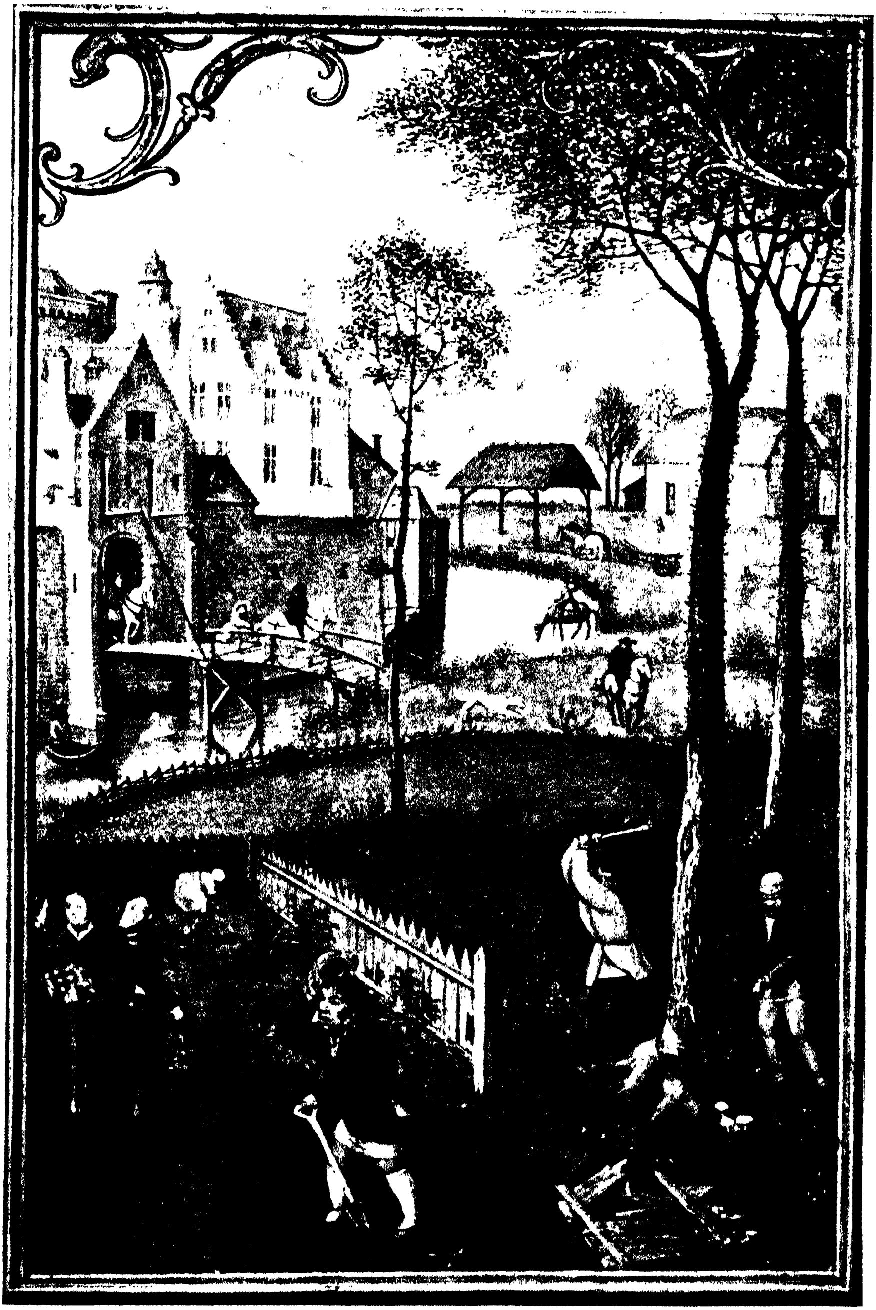
The great principle underlying the Direct Method is that we should, as soon as possible, use French "directly", freeing ourselves from the tyranny which English will exert over us, if we are continually harking back to it. Let the teacher, then, talk as much as possible in French. Let him give orders in French—*Levez-vous*, *Asseyez-vous*, *Un peu de silence!* Let him give his pupils French names, and invariably call them by these. Let him attempt to explain new French words in terms of those already known But, throughout, let him make sure that the meaning of each word is perfectly clear. The attempt to explain new French words in French is valuable not so much by the result as by the process. When doing it, one may well clinch the matter by mentioning the English equivalent. Thus, if I explain *griffonner* as *écrire mal* or *écrire peu lisiblement*, and even if I go on to write badly on the blackboard and say, *J'écris mal, c'est-à-dire, je griffonne*, I shall do well to " rap out " the word *scribble* (the intelligent pupils will have probably hit upon it already); for English is our centre of reference. Whenever we are in doubt about a foreign word, we want the English to make us quite clear and sure. This is not out of harmony with returning to the foreign language, and continuing to think and speak directly in it.

But this apparent concession must not be taken as an excuse for dropping back to the " Translation Method ". The writer remembers handing a class, previously taught on Direct lines, to a less experienced teacher. The book used during the time this teacher had charge was *Dent's New Second French Book*,[1] which is suitable for Direct work. But when the writer returned to take over the class again, he found that the pupils had merely been translating the book into English. And, when he attempted to carry on in the way for which the book was designed, he found at first very great difficulty. The pupils had lost the habit of reading directly.

[1] (Dent.) An excellent book for the second half of the Second Year or the first half of the Third Year (according to the ability of the pupils).

There are some enthusiasts for the Direct Method who have not seen the importance of the qualifications which we have made. Dr. Hedgcock is among them. It is rather surprising that one who does not set much value on correct speech should nevertheless insist on talking and thinking in French from the first. Yet such is the case. Indeed, Dr. Hedgcock goes to the length of maintaining that the Direct Method is valuable as a discipline chiefly because it takes the child again through the processes whereby he has learned to recognize the things around him and to have ideas about them (with a new set of words attached to them). And he claims a superiority for modern language study over all other branches of the curriculum on the ground that " it is a more general training, appealing to a large number of mental processes ". But if the child has already, up to his present age, had a good education, which has brought him to a clear and adequate knowledge of certain things and ideas, there is no point in going through it again, whether with English or with French words. Further, to put language-training above other special subjects merely because it is " more general " is a mistake. For the same reason, journalists would be exalted over professors of mathematics, doctors, and artists. As a matter of fact, any person who should devote his life to the study of the sciences, with their modern multiplication and variety, would probably live through a larger number and a greater variety of mental processes than the most versatile journalist or the most voluble public speaker. No intelligent educationist doubts the supreme value of language. It is not merely a means of communication, but a necessity for thought itself, at any rate for all that is above the most rudimentary ideas. It is, of course, essential to the mathematician and the scientist. The latter, indeed, may feel the need of its precision and definiteness even more than the ordinary journalist. But when once it has been acquired, together with all the attendant ideas which it implies, there is no need to do all, or a large part, of the work over again—and no profit in doing so. By substituting new words for the old, we can go on thinking and talking in a foreign tongue, on the basis of the experience through which we have passed in learning our first language.

The chief value of having pictures and concrete objects to talk about in the early stages is that they help the child to think and speak directly. There is no harm in giving the English words, provided that these are ignored as soon as their defining purpose has been served. As we have already indicated, it is absolutely necessary to " give the English " in some cases. In many more it is advisable to do so. Let us take another example. The word *meuble* occurs in the early stages, and the conscientious teacher attempts to make the meaning clear by pointing to a chair, a table, a desk, and a cupboard, saying each time, *Voici un meuble*. But the dull pupils, at any rate, will be mystified. If, however, they are told at once that *meuble* means a *piece of furniture of any sort*, the teacher can go on to use the word, and require them to use it, without any loss of " directness ", but with the gain of absolute certainty and precision of meaning.



CONVERSATION PICTURE

March: Gardening

*From the Miniature by Simon Bening in the British Museum, London*

## Direct Method and French Grammar

Grammar is absolutely necessary for both English and French, if correct construction of sentences is to be secured. In English, one can get on longer without it, relying merely on imitation of constructions already heard or read, than in French. But sooner or later, one will trip even in English, if one relies merely on imitation. The child begins by saying, " Jack and me will come ". He is pulled up, and referred to " correct usage "; and changes his sentence to " Jack and I will come ". But a little later, profiting, as he thinks, by the good example which has been set him, he says, " These cakes are for Jack and I ". Now, is it not obvious that, if he is to play the game, he must know the rule; in other words, that he must know his grammar? " No," says Dr. Ballard,[1] " tell him to put himself first, and he will say, ' These cakes are for me and Jack '." He may do so. But after his first experience of *me*, he will tend to avoid it. Further he has been taught not to put himself first. And, although this is not a rule of grammar, but one of politeness, it will probably govern a well-bred boy more than any other consideration.

Dr. Ballard, who wrote a number of articles in the *Times Educational Supplement* some years ago to belittle the necessity of grammar in English, apparently does not see that his suggestion, even if successful, is only putting off the evil day—the day when a mistake will be made. For all he suggests is only a further appeal to blind imitation. Dr. Ballard, however, went further. In the articles referred to, he maintained that grammar is impossible to children of the primary age; their minds, he tells us, are not ripe for it. And in a book on the subject, which he has published more recently, he writes that " unless we can show that it is suited to the understanding of children under fourteen years of age, we have failed to make good its claim to a place in the curriculum of the elementary school ".[2]

But, if it is impossible for English children, it is also impossible for French children. These have been shown to be no more intelligent than English children. The results of Binet's tests, when applied in London, have shown, indeed, a slight advantage on the English side. Now, if Dr. Ballard were to translate his statements with regard to the impossibility of teaching grammar to primary children into French, and get them published in a French educational paper, he would bring down upon himself contradiction. For, if what he says is true, grammar, or, as we may call it, the rules of the game of speech, must not be taught during the primary period. And if this is so, no French person who has been limited to primary instruction should hope to speak or write his mother tongue correctly.

The commonest of sentences in French depend for their correctness on a knowledge of grammar. How shall a French child learn to say or

[1] Dr. P. B. Ballard, *Teaching the Mother Tongue*, p. 55.
[2] *Teaching the Mother Tongue*, p. 23.

write, "*Voici le billet que j'ai écrit*" and "*Voici la lettre que j'ai écrite*" without some knowledge of the past participle and of its agreement with the direct object which precedes? Whether these names are used or not, the rule must be understood and applied. In other words, the French pupil "needs to be able to explain the mechanism of the language in detail"; he needs "to analyse his mother tongue in order to acquire a working knowledge of it".

Accordingly, we find that in French primary schools the children begin the study of grammar in the very lowest classes. Indeed, these children probably know more grammar than those of the top class in an English primary school. The writer has before him, as he writes, a grammar book which is in use in the junior (*i.e.* primary) classes of the Lycée Français de Londres. It is intended for the Classe de huitième,[1] and, for the sake of illustration, we give a short extract from it.

"**Le participe passé avec avoir.** — Règle: Le participe passé construit avec l'auxiliaire avoir s'accorde avec le **complément direct** d'objet, à la condition que ce complément direct soit placé avant le participe. Ex.: Quelle jolie montre mon père m'a donnée!

"Le participe passé construit avec avoir reste invariable si le complément direct est placé après lui ou s'il n'y en a pas.

| | | |
|---|---|---|
| " Ex.: | Mon père **a acheté** . . . une montre. | INVAR. Comp. dir. après. |
| | Les enfants **ont** bien **dormi.** | INVAR. Pas de comp. dir." |

Dictation is a more frequent exercise in French schools than in English ones. And there is a special reason for this. The spelling in French turns very frequently on questions of grammar. The dictation exercise is thus not merely an exercise involving spelling, as such, but an exercise in, and a testing on, the rules of grammar. For these reasons—as well as for its advantage as a means of cultivating the ear—it should be a very frequent exercise in our French lessons.

**Necessity for teaching English grammar.**—Grammar, then, must be taught. But how? It is very unfortunate that the subject has dropped into such insignificance in English primary schools, so that English pupils often reach the age of eleven without any definite knowledge of it. The chief reasons seem to be that in English we can go on much longer by imitation, without tripping, than is possible in French; and that a little vague knowledge of the subject is of doubtful practical value. It has been affirmed that the grammar our pupils do learn is of practically no use in securing correctness of expression in English composition. But this may be because so little is taught, and because what is taught does not bear closely on the actual formation of sentences. It is often taught as a subject apart from composition. Now, if the mistakes made with regard to *Jack and me* and *Jack and I* were made the occasion of an impromptu talk, in which the pupils learn that *I* is the pronoun to

[1] Children of 7 to 9 years.

be used as the subject and *me* the pronoun which should be employed as the object of a verb or of a preposition, the children might learn some grammar which is of real use in composition. It is said that when composing, children—and even adults—have no thought of grammar.[1] But that is because grammar is so insignificant a matter to them, and because it has not been brought into constant relation with the realities of composition.

**Difficulties of French grammar.**—But the teacher of French in a central school has to take his pupils as he finds them. And he will have to give much attention to grammar. Once again, then, we ask, what is he to do? He will certainly not begin with a French grammar, written in English, with exercises in translation at the end of each chapter or lesson. That system will perpetuate the error of putting English " in the way ", and preventing the free development of fluency in French. The writer remembers, more than thirty years ago, making a compromise between the old Translation Method and the new Direct Method. He had only two lessons a week with his class. In one of them, he followed on the old lines, using *Longmans' French Course*, and in the other he adopted the Direct Method, using *Dent's First French Book*. This system produced fairly good results. The definite grammar taught in one lesson ensured that there was no vagueness in the other. But progress was slow; and there was no organic connexion between one lesson and the other. It is better to plunge completely into a Direct course. There are not wanting books which give all the attention to grammar which is necessary. We have already mentioned *Dent's First French Book*. If this book is used, four wall pictures (representing the four seasons) will be required for class teaching. But, in these days, there are many others which are almost equally good, and among which one has only the embarrassment of choice. Among these we may mention *First Steps in French*,[2] by Ripman, *First French Book*,[3] by Mackay and Curtis, *Mon Livre—Premier Cours de Français*,[4] by Saxelby, *First French Course*, by Florian,[5] and *Mon Petit Camarade Français*,[6] by Lavault, Lestang, and Dumville.

Working with one of these books, the teacher will not be tempted to put grammar first. The language will come first, and a knowledge of grammar will grow as the language is acquired and examined. Grammar teaching will be incidental. It will take place as sentences are presented which require examination and explanation. Towards the end of the course, say in the Fourth Year, the grammar might be revised and systematized **in French** by the use of such a book as *Première Grammaire Française*,[7] par Berthon. This book would be still more useful if it had a few exercises at the end of each chapter. But an intelligent and resourceful teacher can make some for himself.

The book just mentioned is entirely in French, and gives scope for further practice in the French language as well as impressing the essentials

[1] See *Teaching the Mother Tongue* (Ballard), pp. 27–8.
[2] Dent. [3] Arnold. [4] Ginn & Co. [5] Rivington. [6] McDougall. [7] Dent.

of French grammar. But, during the incidental teaching of grammar to which we have already referred, the teacher will not hesitate to use English whenever he judges that the matter is thereby made clearer in the pupils' minds. Grammar is a difficult subject, especially to those who have had little or no training in the primary school, and if to its difficulties is added the additional one of thinking in a strange idiom, the beginner, at any rate, will probably be overwhelmed.

Let us take an example, culled from Dr. Hedgcock's book.[1] "You are teaching the Present Indicative of a French verb to a beginner, and tell him that the French form, *Je ferme*, for example, has, in English, three equivalents: *I shut*, *I am shutting*, and *I do shut*." Of course, the last translation is rare. It would only occur when insisting. Thus if I complain that someone rarely shuts the door, he may reply, *Mais même quand je la ferme, vous ne m'en remerciez pas.* The other two translations, however, are common, and could both be cited to a beginner.

But Dr. Hedgcock goes on: "This can be of no practical use to him. He needs to be able to use such forms as *Je ferme*, *il ne ferme pas*, *fermez-vous? ne fermez-vous pas?* &c., with ease and correctness. All that you can hope to do by suggesting the English forms is to lead him to invent such hybrids as *Je suis fermant*, *Je fais ferme*, &c.; and if he does so, you will only have yourself to blame." But if I tell a pupil that *Je ferme* means both *I shut* and *I am shutting*, and if the boy understands what I say, surely he will be disposed to give me back *Je ferme* for *I am shutting*. As a matter of fact, however, in the early stages at any rate, there will be no translation of English into French. When once the pupils understand the full meaning of the French, they will be encouraged "to play with" the various forms of it; in other words, to use them without translating them.

To omit to compare the English forms with the French ones is to miss one of the advantages to be derived from the study of a modern language. "What do they know of English, who only English know?" In studying the sounds of French, we compare them with English sounds, and we get a clearer knowledge of the pronunciation of our own tongue. Similarly, in studying the forms of expression in French, we compare them with English forms of expression, with advantage to our knowledge of both languages.

Let us take another example from Dr. Hedgcock's book.[2] "Suppose you are dealing with *dont* and *de qui*, will you help your pupil to seize the difference by translating:

Le monsieur dont vous parlez. The gentleman of whom you speak.
Le monsieur à la fille de qui vous parlez. The gentleman to whose daughter you speak?

Can the construction *to whose daughter* help with *à la fille de qui*, which is totally unlike? No," says Dr. Hedgcock, "the difficulties of French

[1] *Op. cit.*, p. 27. [2] *Loc. cit.*

grammar cannot be made simpler by comparing them with the different difficulties of English."

Now, the translation " to whose daughter " certainly does not help with the second sentence. If, however, the children understand that *dont* and *de qui* both mean " of whom ", but that *dont* must always be the first word of its clause, they will realize the impossibility of using *dont* in the second sentence by a word-for-word translation. *Le monsieur dont à la fille vous parlez* is the only way in which to write the phrase, if I attempt to use *dont*. The pupils may have enough " feeling " for French to realize its impossibility without translating. But a word-for-word translation will clearly show up its incongruity—" The gentleman of whom to the daughter you speak." It is as clumsy in English as it is in French. I am forced, therefore, to use *de qui*, which can be placed after *fille*, and I get the form *Le monsieur à la fille de qui vous parlez*. In order, however, to " feel " its appropriateness, I must not translate *de qui* by " whose " but literally—" of whom ". " The gentleman to the daughter of whom you speak " is quite good English, and it helps to satisfy us of the correctness of the French.

Often the skilful choice of an English equivalent for a French word will help the pupil very much in using the latter correctly. Take, for example, the word *celui* (with its other forms, *celle*, *ceux*, and *celles*). By derivation, it is composed of two words, meaning *Behold, that one*. But if we give it the meaning *the one* (the demonstrative *ce* being weakened to a mere definite article) we shall find this meaning a guide to using it correctly. The rule is that *celui* cannot be used independently; it must be followed by *-ci* or *-là*, by the preposition *de* (with, of course, an object), or by a relative pronoun (which, of course, begins a clause). Thus, if I ask, *which road* (*chemin*) *will you take?* the answer (in French) may be:

*Celui-ci*, This one (The one here).
*Celui-là*, That one (The one there).
*Celui de droite*, The one on the right.
*Celui qui est le plus court*, The one which is the shortest.

It takes a considerable experience of French to feel the need of something after *celui* (if only a *-ci* or a *-là*). But if I advise the pupil to give it the meaning " the one ", he will at once feel this need. I cannot say " the one ", and stop there. I must go on, and say " the one here ", " the one there ", " the one of my brother ", " the one which I had yesterday ". These phrases may not be the best English. They are not intended to be. But they illustrate very clearly the need of adding something to *celui*.

Our answer, then, to those reformers who would have us avoid English entirely, when dealing with French, is as follows. The fact that our pupils possess a mother tongue has its drawbacks. It means that we cannot have a clean slate to write on. It means that the vocal organs of our pupils are set to the formation of a different system of sounds. It means that they are accustomed to think and to express themselves in certain definite

ways, which are often very different from those of French. But it also means that they have already developed a vast system of ideas of the universe around and within them, which is much the same as that of their French cousins, and which stands ready to receive a new set of labels and expressions. It is the duty of the teacher to press the mother tongue into the service whenever he finds it helpful in awakening the ideas which should correspond to those new labels and expressions, or whenever it can help in making those labels and expressions more definite and more capable of assimilation. But he must always bear in mind the truth that *en forgeant on devient forgeron.* Only by talking French can one learn to speak it. Let there be as much French spoken as possible. Let English be banished as much as possible. But see to it that all the language used is thoroughly understood.

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## CHAPTER IV

# Lessons in Pronunciation

**i.**—Let us now return to our first sentence in French—*Si six scies* . . . . There is no reason why the children should not learn to write it from dictation, as well as to indicate the pronunciation by putting the phonetic transcript under each word. No attempt need be made to talk about grammatical forms yet. But, by doing this, in the case of this sentence, and also with the succeeding ones, the pupils will store up in their minds a number of French sentences which will form an excellent background of knowledge to support them when they come later to attack an organized course. Let no one complain that these preliminaries are wasting time. " It is a great mistake to go too fast, especially at the beginning—a fault into which nearly all of us fall. Nothing pays so much as thoroughness. It gives the class confidence—a most important thing—and lays a sure foundation which will save much time eventually. If one goes too fast, the pupils become discouraged, and will very possibly dislike a subject which they must like and enjoy if they are to do any good at it." [1]

**e.**—Our second sentence introduces what is to most English people a new vowel—that represented by " e " in the alphabet of the International Phonetic Association. It will not do to allow an English approximation—even in the first lesson. It will not do to say—as is done in many books—that this vowel is " sounded like *a* in *day* but less prolonged ". In most parts of England, the " *a* in *day* " is a diphthong, and we must avoid this diphthong at all costs. Only in a few parts of the country (e.g. in Glasgow) is " *a* in *day* " sounded as a pure, single vowel, and in the way necessary for French. The sound required is much more like i (the first vowel we

[1] W. Mansfield Poole on " Modern Languages " in *The Practice of Instruction* (National Society's Depository), p. 477.

have studied) than the "*a* in *day*" as pronounced by a great many people in London and the south. To produce it, one may start with i, and drop the lower jaw—with a corresponding fall of the tongue—about $\frac{1}{10}$ inch. It is a short, sharp sound, which must be practised a great deal by most of us before we can be certain of producing it readily whenever required.

Accordingly, we give the children a French sentence to practise which repeats this vowel a great number of times, as follows:

J'ai été élevé et hébété chez des hérétiques zélés et effrénés.
ʒe ete elve e ebete ʃe dez eretik zele e efrene.
I have been brought up and stupefied among zealous and unbridled heretics.

This sentence contains no vowel but e, except in the case of *hérétiques*, where we have one further example of our first vowel (i). The word in question requires very careful attention, because it is the same word as the English word corresponding, and because, in such cases, there is great danger of pronouncing the French word somewhat like the English one. In the first place, the two corresponding words have not a single vowel in common. In the second place, the English word has the strong accent on the first syllable, while the French word has three almost equal accents, the last being a trifle stronger than the other two. And, lastly, the *r* in French should be trilled, whereas, except in the north, this is seldom done in England. The untrilled *r* which is heard in London and other parts of the south is usually represented in our phonetic alphabet by inverting the ordinary letter, thus—ɹ. The English word we are studying, as pronounced in the south of England, is represented as follows:

ˈhɛɹɪtɪks

The little dash at the beginning indicates that the following syllable has a strong accent. The vowel represented by ɛ is produced with the mouth more open than for e. As a matter of fact, the vowel of this first syllable has the mouth only a little more open than for e, whereas the letter ɛ usually represents a more open vowel, that at the beginning of *air*. The author himself prefers to show this difference by using another, though similar, letter for the vowel intermediate between e and ɛ which is found in the first syllable of *heretics*—the italic letter *e*. This intermediate vowel—or middle e, as it may be called (the others being called close e and open e)—is the first element of the diphthong in *day*, the second element being ɪ.

The teacher, in warning the pupils off this diphthong as a substitute for e in French, would do well to cause them to practise the diphthong in an English sentence, both to distinguish the English diphthong from the pure French vowel, and to make sure that the English pronunciation of the pupils is good. To this end, a sentence like the following may be taken:

They say pay-day came eight days late.
ðɛɪ sɛɪ pɛɪ dɛɪ kɛɪm ɛɪt dɛɪz lɛɪt.

The pronunciation represented here is considered to be the standard of southern English. In Glasgow, and other parts of the north, however, we should hear:

ðe· se· pe· de· keːm eːt deːz leːt

(the one dot meaning " half-long "). This vowel, of course, can be carried straight over into French. And the children of Glasgow are fortunate in this respect. But in London, and other parts of the south, one hears not only a diphthong, but one with the first element much more " open ". We get:

ðɛɪ sɛɪ pɛɪ dɛɪ kɛɪm ɛɪt dɛɪz lɛɪt,

and even:

ðaɪ saɪ paɪ daɪ kaɪm aɪt daɪz laɪt

(a representing the vowel which is heard in *hut* when spoken by a cockney, or in *hat* when spoken by a Yorkshireman).

Let not the objection be made that we are wasting time. Even from the point of view of French, this training in careful discrimination between sounds will pay in the long run. But, as we have already indicated, the work we are doing involves a training in English pronunciation, as well as in French speech.

The children, therefore, should be encouraged to repeat the English sentences which we give them, as well as the French ones. And they should be instructed that the matter should not end here. The sounds which they give in these sentences should be carried over into all English which is required to be rendered in the best possible way. In singing, for instance, they should be taught to give careful attention to their vowels, as well as to their consonants. And, as all the sounds have to be introduced in singing, we should, in our voice exercises, practise not only those which are favourable to a good tone, but those which present difficulty. The English sentence just cited has, like the first we quoted, just eight syllables. It can, therefore, be used as a singing exercise, with runs up and down the scale, as well as being repeated in ordinary speech.

ɛ.—Our third vowel in French (ɛ), like the first, is represented in English as well as in French. And, as in the former case, we give a sentence containing it in each language, as follows:

Their care scarce spared Claire's rare fair hair.
ðɛə kɛə skɛəs spɛəd klɛəz ɹɛə fɛə hɛə.

Elle aimait père, mère et frère; mais elle n'aimait guère ses maîtresses.
ɛl ɛ·mɛ pɛːr, mɛːr e frɛːr mɛ ɛl nɛ·mɛ gɛːr sɛ mɛ·trɛs.
She loved father, mother and brother; but she loved her mistresses very little.

It will be noted that in the English sentence there is always an *r* in the spelling after the letters representing the vowel. This *r* is not sounded in the south of England, being rendered by the vague vowel represented

by ə (the vowel of the second syllable of *better*). We thus get a diphthong (ɛə) in all these cases in the south of England. But in Scotland, and other parts of the north, the *r* is pronounced as a trilled r, and the vowel remains pure, thus:

ðɛr kɛːr skɛrs spɛːrd klɛːrz rɛːr fɛːr hɛːr.

This pronunciation must be adopted in French. Once again the Scottish children score. Southerners must be very careful not to pronounce such words as *père* and *mère* as they pronounce *pair* and *mare* in English. Much practice of the French sentence will be necessary in their case. Everyone must learn to trill the *r*.

Note also that in the French sentence there is one instance of the previous vowel (e). This is all to the good, if the pupils are careful to observe the difference. It serves to emphasize that difference. Finally, the *p* of *père* requires attention. We shall have a special sentence to practise this later; but we cannot allow children to begin by sounding it in the English way. The English, as a rule, do not start the voice of the following vowel directly the lips open. There is usually, immediately after the opening of the lips before the voice of the vowel begins, a short interval during which much breath escapes, causing a definite aspiration. English *p* should strictly be written so as to indicate this. It might be represented by $p^h$. But this aspiration must be avoided at all costs in French. One way which helps is to say *ère* first, and then to repeat it, gently and unobtrusively closing and opening the lips immediately beforehand. The consonant may sound somewhat like a *b*; but it is not a *b*, for there is no voice before the opening of the lips. It may help, indeed, to begin by pronouncing the French word *ber* (bɛːr). Since there is voice already with the b, there can be no interval without voice, when the lips open. By thinking of *b* and shutting off the voice until the lips open for the ɛ, we may arrive at a satisfactory French *p*.

**a**.—Our fourth French vowel, represented by the symbol a, is again a sound which is found in English. But, in English, this vowel is used in different words in different parts of the country.

For most Londoners, and for many others in the south, the following pair of sentences will be suitable:

Sugg's son shut up some young dun cubs.
sagz san ʃat ap sam jaŋ dan kabz
(j represents the sound of *y*, and ŋ the sound of *ng*)

Madame la marquise va à la gare avec papa et moi chaque soir.
madam la markiːz va a la gaːr avek papa e mwa ʃak swaːr.

We see, therefore, that *shut* (in London speech) and *chaque* are pronounced alike, except for the final consonant. Mr. H. E. Palmer, a well-known phonetician, illustrated the similarity of the English and French vowels of these sentences by taking a Londoner and a Frenchman and by giving

the former a paper bearing the words *Love one* and the latter a similar paper with the words *l'avoine* upon it. Neither man knew what was written on the paper of the other. Each was requested to read what was on his paper. And each, when asked, declared that the other had read the same as he himself.

But in Yorkshire and Lancashire, and other parts of the north, the English sentence which we have given is pronounced with a different vowel.[1] In these places, however, the same vowel as the French one is given in such words as *hat* and *rat*. The English sentence which would be necessary to illustrate the French vowel for these people would be one like the following:

Jack's cat can have that fat black rat.
dʒaks kat kan hav ðat fat blak rat.

It may be noted, finally, that Londoners would pronounce this last sentence with a different vowel. It is, of course, well known to all who live in London, and it has received the symbol æ[2] in our phonetic alphabet. It should never be given in any French word. Yet, although Londoners have the vowel required in the French sentence (in such words as *up*, *love*, &c.) they will persist in giving æ. Probably ninety per cent of the children who learn French in the south pronounce *avoir*, *après*, and *avec* with æ in the first syllable instead of a. This alone is a testimony to the need of phonetic instruction. In a great many cases, the nature of the vowel required has been made clear. But there has not been enough practice; and the pupils revert to what they are accustomed to give when they see the letter *a* in a similar position in English.

**p.**—We have now seen how four of the French vowels can be taught, and fixed in the ears and mouths of the children as parts of real French. There are sixteen of them in all. And then there are all the consonants to be studied. We cannot deal with them all in this place. Let it suffice to give as an example the treatment of one of the consonants—*p*.

We have already noted that this consonant has an aspiration in English (see p. 161), and should properly have some indication of this in the symbol ($p^h$). But here, as in similar cases, we can use the same phonetic symbol in the two languages, provided that we bear in mind the difference. With this reservation, we can give English and French sentences containing the sound, as follows:

Pa's prize pet pig sips up pea-soup.
pɑːz[3] pɹaɪz pet pɪg sɪps ʌp piː suːp[4]

(This is the southern pronunciation; it would have to be altered in some respects for the north.)

[1] Represented by ʌ in our phonetic alphabet.
[2] The *sound* is not a double one, though the letter is.
[3] The sound corresponding to ɑ is obvious.
[4] u is the phonetic symbol for the *oo* sound.

Papa parle de partir pour Paris après Pâques avec Paul et Pierre.
papa parl də partiːr puˑr pari aprɛ pɑːk av*e*k pɔl[1] e pjɛːr

Papa speaks of leaving for Paris after Easter with Paul and Pierre (Peter).

The explosion of air with an English *p* is usually sufficient to blow out a lighted match held in front of the lips. But with the French *p*, this will not take place, since the vocal cords are brought together for voice at the very moment of opening the lips, and cause the outrush of air to be much reduced. It is rather dangerous to allow children to use lighted matches. So it is better to let each hold up a thin sheet of paper close to the lips. This will be little disturbed by French *p*; but, if held up lightly, it will be blown down by a strong English *p*. Even with the palm or back of the hand held closely to the lips, one can distinguish the two sounds quite readily. The word *papa* can be used in both languages, though of course the pronunciation of the vowels and the accentuation will be difficult (English—pəˈpɑː, French—papa). It will be found also that, with one breath, the French word *papa* can be repeated many more times than the corresponding English word. A person of good chest capacity can say the French word *papa* (two syllables) with fair loudness over eighty times. The pupils might be encouraged to do their best to reach a good number—say fifty. They should, however, be cautioned against overstraining themselves, being advised to get a good result rather by much practice with very gentle *p*'s than by great effort. And, when they have " played " with *papa*, let them practise the whole French sentence in the same way as was described at length in the case of our first sentence.

**General Advice.**—The task of working through all the sounds of French in the way indicated with a sentence to illustrate each, will occupy the greater part of the first term. The pupils, however, will not be able to complain that they are not learning French, but only sounds. As a matter of fact, if attention is given at all times to the meanings of the words, they will have acquired a stock of French sentences, which, though somewhat crude because of the purpose to be served, will form a useful foundation for further acquirement.

The author began in the early days by writing each exercise on the blackboard, and causing the pupils to copy it into their notebooks. This, however, took considerable time. Further, mistakes were sometimes made in transcription. Notebooks, too, were not infrequently lost, and replaced with difficulty. Finally the poor writing and printing which often resulted from the speed at which the sentences had to be taken down under pressure of time, and the deterioration of the books with use, were not conducive to careful and accurate practice. To obviate these disadvantages, as well as to give the products of his thought and experience to others, the writer has had the whole of the sentences published in a little book, specially designed for the pocket, and entitled *Correct French Speech*.[2]

[1] ɔ represents a sound similar to the vowel in *not*. [2] Pitman.

The teacher who works through this book thoroughly with his class will not only start his pupils on the right road, but, if he adheres to absolute correctness at all times, will be doing great good to himself. It is beside the point to say that these beginnings are elementary, and that the teacher is merely boring himself with repetition of what he already knows. The great maxim for all language study is, *Répétez sans cesse.* It applies to the teacher as well as to the pupil. Progress in a language is not merely a matter of acquiring new words and forms of expression, but still more of gaining ever-increasing facility in dealing with the common words and forms of expression. The teacher who faithfully and enthusiastically works with his pupils at these exercises is training his own ear and tongue as well as theirs.

We all sigh for complete knowledge of a language. But this in the fullest sense is unattainable, even to the most erudite native. In the realm of pronunciation and diction, however, a very satisfactory approximation to perfection can be achieved. After a year of thorough work in this department, our pupils, as well as ourselves, will be able to produce with exactness all the sounds of the language, and to detect the slightest variations from standard speech made by others. The writer has had pupils who, after one audition of a gramophone record made by an actor of the Comédie Française (the French national theatre), could readily point out slight variations from the normal in pronunciation. This is an achievement which is by no means to be despised. It involves an ear-training which puts the pupil at ease in any French-speaking environment. And it removes the pupil from the danger of being misled by would-be teachers of the language, whether natives or not, who have no sound knowledge of French phonetics.

But what about progress in " French "? With all this attention to pronunciation, you are holding back the pupils from progress of the " ordinary " kind, especially from working for the usual examinations. These are the objections which some will make. In the first place, it should be borne in mind that the chief object of the school is not success in examinations, but the best possible achievement in each subject. The London central schools have gained the high reputation which they possess for sound work largely because they have consistently refused to accept the tyranny of examinations. And among the subjects which they have taught so well, French is by no means the least conspicuous. It is to be hoped that the further development of schools of their type will proceed on similar lines. Little is to be gained by following in the wake of secondary schools of the older kind. These schools have produced few outstanding successes in the realm of modern languages. They are too much under the influence of the old classical régime. It behoves the modern schools of the future to strike new paths. They have a great opportunity. And, if only they escape the domination of examinations, they will be able to teach French as a living tongue, and achieve results hitherto unknown.

But it is by no means certain that this careful oral training is incon-

sistent with the production of good examination results at a later stage. While practising the sentences for facile and correct pronunciation, and while preparing pieces for recitation in the way which we shall describe presently, the pupil, provided that he gives due attention to the meaning of the words, is all unconsciously absorbing a stock of French expressions which will never fail him, and which will form the foundation of greater acquisitions in the future. Those who have studied psychology will know that the centres in the brain which are concerned with language and the ideas connected with it include centres not merely of sight and of the ideas involved, but of sound and of speech movements. A complete grasp of language must therefore include much repetition of sounds and of the movements of speech. Indeed, these are the most essential fundamentals. If, however, they are neglected or receive insufficient attention, whether because they are difficult or because concentration is required on the written forms, the whole fabric of speech is weakened. And the very power which it was desired to foster—written composition—may suffer on that account.

Much of our acquisition in the field of language is subconscious. While we are consciously concentrating on one thing, another—more or less closely connected with it—is also apprehended, and often more thoroughly than if we had specially attended to it. While the child is struggling with the difficulties of speech in these sentences, he is all unconsciously obtaining a firm grasp on the usual forms of expression. Certain it is that many pupils brought up on thorough oral methods have shown remarkable aptitude when put later to composition on paper.

By the end of the first term, if not before, the pupils, having studied all the sounds of French in actual French sentences, will be ripe for beginning a Direct Course. We have already indicated some of the many books which are now available.[1]

But once again we must insist that practice in pronunciation must not stop. All new words introduced must receive the most careful attention with regard to their pronunciation. Further, the exercises should be continued. Greater and greater facility should be required, without any sacrifice of correctness. The little book of exercises should be a *vade-mecum* to each pupil for many a day to come. And the teacher should have weekly " hearings " of the pupils. Time tests can now be introduced. Take, as example, the French sentence, *J'ai été élevé* . . . . A pupil who has thoroughly mastered this should be able to repeat it three times in ten seconds. And if he drops practice for a time, he will soon be unable to do it. It is possible to test a whole class, with one sentence for each pupil, in a very short time. Of course, the times for different sentences will vary. The teacher, by testing himself, can discover the number of times that each sentence can be repeated in ten seconds.

It is a good practice at the beginning of every lesson to " switch on " to French with a few exercises. At the very least, the vowels should be

[1] p. 155.

recapitulated. These can sometimes be repeated as separate sounds But it is more in accordance with our principle of having " real " French at all times to put them into sentences. For this purpose, the author uses the four following sentences, which give the sounds in the order of their arrangement according to formation:

1. Il était là. (i, e, ɛ, a)
2. Jacques vole autour. (a, ɔ, o, u)
3. Jules veut ce meuble. (y, ø, ə, œ)
4. Mangeons vingt lunchs. (ɑ̃, ɔ̃, ɛ̃, œ̃)

The class can be asked to repeat them simultaneously. Then a few individuals can be called upon, the utmost exactness being always required.

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CHAPTER V

# The Gramophone and the French Lesson

Side by side with the Direct Course which is being followed, definite lessons in diction should be given—at least one each week. It is now time to begin the study of intonation. The teacher would do well to prepare himself for this work by careful reading of *French Intonation Exercises*, by Klinghardt and Fourmestraux (translated by Barker).[1] By doing this, he can ensure that his own intonation, in dealing with the ordinary lessons of the Direct Course, is good. Further, he can select certain of the French extracts for recitation by his pupils. It will, however, be necessary to prepare copies, sufficient in number to give each child one, unless the piece selected can be found in the books used by the pupils.

**The Gramophone**

But by far the best plan is to select pieces of which gramophone records can be obtained. There are several firms which publish satisfactory records. We have, first, The Gramophone Co., Ltd.[2] This firm issues a book entitled *Colloquial French for the English*, together with fifteen double-sided records, beginning with ear training for the French vowels, and going on to words, common phrases, and examples of conversation and various other kinds of diction. It can scarcely be recommended for class use. But it is very useful for the keen private student, including the teacher who desires to prepare himself thoroughly for oral work with his class.

Next we have The Linguaphone Institute.[3] This firm publishes a book on Direct lines, with a gramophone record of the text of each lesson. We do not recommend this book for class use. And, since the records

[1] Published by Heffer & Sons, Cambridge. [2] 363 Oxford St., London, W. 1.
[3] 24 High Holborn, London, W.C. 1.

go with the book, we can scarcely recommend them either for use in school. For the private student, they may be of great assistance, especially as they deal with many of the ordinary situations of life. But there is not sufficient gradation and careful development in the lessons to put them on a level with the Direct courses which we have already recommended for schools. Further, between the lessons there are interspersed grammar lessons with translation exercises which, as we have already pointed out, are not in conformity with the principles of the Direct Method. We may remark, also, that there does not appear to be much connexion between the matter of these grammar lessons and the texts of the Direct Course which they interrupt. Lastly, it is assumed that correct pronunciations can be acquired by attempting to imitate the sounds produced on the gramophone, and the first lessons are pronounced so slowly and so very carefully as to make them somewhat artificial in character.[1]

Now the gramophone, useful as we believe it is, is not chiefly an aid to pronunciation. Except in the case of a few specially gifted individuals, the sounds of a foreign language cannot be acquired, after the age of infancy has been passed, by mere imitation of what is heard. There must be definite guidance by one who knows the mechanism of the foreign language. Where this guidance exists, the gramophone can be used as an aid, giving, as it does, the result to be obtained. But the slow, careful pronunciation of each sentence, word by word, is not to be advised, even in the early stages. It is not the normal way of speaking. When a person sets out to say a sentence word by word, he fails to a large extent to give us what the gramophone is most useful for—the " tune " of the sentence, i.e. the normal accentuation and, above all, the rise and fall of the voice. It is not to the point to argue that one should go very slowly indeed because we are dealing with beginners. There might be some force in this suggestion if a person were speaking to beginners on the wireless. For here there is only one chance to hear. But with a gramophone record, and with the text in front of us, there is no need to modify ordinary speech. It is possible to have a given phrase, or even a single word, repeated as many times as we choose, until we are perfectly clear as to what has been said, and how it has been treated. It will, indeed, be a matter of astonishment to some that so many repetitions are often necessary before one can be quite certain as to the exact method of treatment. It should be added that the Linguaphone Company has also published a book of more literary extracts which are quite suitable for school use. The extracts include pieces from well-known plays and some fables from La Fontaine. These are extremely useful, because they give us the intonation and accentuation of really live speech.

The third firm which publishes gramophone records of French is Pathé Frères.[2] This firm also publishes a first book on direct lines. But

[1] It should be added that the Linguaphone Company, at the suggestion of the author, has had some of the later lessons rendered at proper speed, and as a Frenchman would normally speak. [2] 30 Boulevard des Italiens, Paris.

here, once again, there is no careful gradation to suit the needs of young pupils. The second book, which consists of extracts from well-known authors, in prose and in verse, and is known as *Textes Français* choisis par Bévotte et Weill, is a good collection, but is too big for use in an ordinary school. The records, however, deserve special commendation. Many of them have been made by actors and actresses of the Comédie Française, and are excellent models for imitation. One would do well to select a few of them—especially some of the fables of La Fontaine and one or two extracts from Molière's plays—and to use these in conjunction with some book already in the school which contains the extracts. In the last resort, of course, one can " graph off " copies of an extract which is particularly desired. Some of the extracts are to be found in the *Junior French Reciter* of Professor Victor Spiers;[1] others in the same author's *Senior French Reciter*.[1] As these are cheap books, it might be worth while to get one or both of them to accompany some of the Pathé records, and to use them also for the reading and study of the other pieces they contain, independently of records. They have phonetic transcripts of all the extracts given, and are consequently very useful in a general way.

It must be borne in mind that the Pathé records specified can be used only with Pathé reproducers, which have sapphires instead of needles. But in many cases Pathé reproducers can be fitted to ordinary gramophones. Further, Pathé machines can be fitted with needle reproducers. It is therefore usually possible with one machine to use records made by any of the firms mentioned above.

As we go to press, our attention is called to a fourth set of records, accompanied by a book of French texts, *Nos Amis Français*, issued by the Gregg Publishing Co., Ltd., Kern House, Kingsway, London, W.C. 2. The records are very good. But there is a new phonetic code, based on the Gregg system of shorthand, and this is a doubtful advantage. The alphabet of the International Phonetic Association, though by no means perfect, is now so commonly used that it seems best to continue with it. Lastly, these records of current French are intended to be introduced to mere beginners. We are of opinion that some preliminary instruction is necessary.

The teacher who is about to take a piece for recitation with his class, aided by the gramophone, should hear it over many times in advance. The really earnest teacher will have a gramophone of his own and will take the record home for careful study. While he will be alert for any peculiarities of pronunciation, he will keep in mind that intonation and accentuation are the chief things to be studied. The vowels and consonants of French should have already been mastered. They may be likened to the bricks and mortar for a building. It is the architecture and construction which now require attention. While, therefore, the pronunciation must not be allowed to deteriorate—there is every reason why it should be still further fixed and facilitated with the good model furnished by the record to help—the great thing is the " tune " of the extract.

[1] Published by Simpkin, Marshall & Co.

### Methods of Marking the Tune

In *French Intonation Exercises*, to which reference has already been made, there are two methods of indicating intonation—one by dots (one for each syllable) and another with slanting lines, supplemented by dots. In another of the books we have mentioned—*Colloquial French for the English*—a method of little dashes is used. Both methods require separate spaces opposite the text for recording the tune. There are several disadvantages in attempting to use such methods freely with the texts met with in ordinary books. Firstly, special pages for recording the intonation would have to be inserted, or used side by side in a separate book. This means that when one is working at the extract one has to cast one's eye to and fro to follow both the text and the indications of intonation. Secondly, it means that every syllable requires attention; for the intonation of every syllable is indicated. But many of the syllables are comparatively " colourless ". They do not require any special attention, and may be allowed " to look after themselves ". Lastly, as one becomes acquainted with the general characteristics of French intonation and accentuation it becomes unnecessary, in studying a given record, to note any but the most outstanding characteristics, sufficient to enable one to reproduce the piece as originally recited, when the record is no longer available. One requires a system by which the text in an ordinary book can be marked without the use of further paper.

The writer has consequently adopted the practice of putting a short horizontal line over a syllable where there is a distinctly perceptible rise in pitch, and under a syllable in which there is a definite fall. If the rise or fall is specially great, the line is doubled. To mark a syllable which is specially accented, i.e. more emphasized for the sake of expression than it would normally be, square brackets are put round it. Often it is necessary to mark both emphasis and pitch. The systems adopted in *French Intonation Exercises* and in *Colloquial French for the English* do not provide for this, except when the syllable in question comes at the end of a group (where, by the way, it is normally fairly accented, and can consequently take care of itself to a large extent).

The marks used by the author can be put in with an ordinary lead pencil, if it is well sharpened. Red ink, with a fine pen, can be used, if the surface of the paper is good enough, for greater clearness. The chief difficulty seems to be that if the lines of the text to be marked are rather close together, there is a danger of mistaking the marking of a given syllable as applying to a syllable printed immediately under or over it, as the case may be. This difficulty may be largely obviated by very careful marking, the horizontal lines being placed very closely above or below the syllables in question. But, of course, the conditions would be better if the lines of print were widely separated.

Other marks can be inserted, if required. Thus, a short perpendicular line may be used to mark the separation of one group of syllables pro-

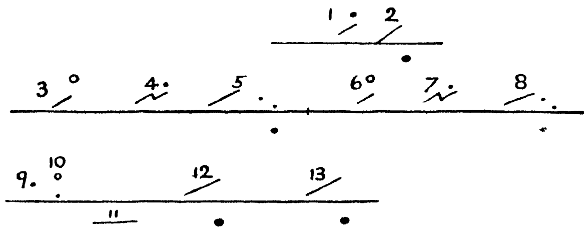
nounced together from the next group. The writer, however, uses this mark only when a longer pause than usual is made. Marks to indicate speed may also be inserted by the side of the lines. Thus *l* beside a line may mean *very slowly*; and *acc.* may mean *increasing the pace*.

We now give examples of the various methods of recording the "tune", taking as our example:

**[1] Le Corbeau| [2] et le Renard**

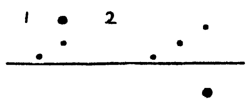
[3] Maître corbeau,| [4] sur un ar|bre perché,|
  [5] Tenait en son bec un fromage.|
[6] Maître renard,| [7] par l'odeur| alléché,|
  [8] Lui tint à peu près ce langage:|
[9] « Hé!| [10] bonjour,| [11] monsieur du Corbeau,|
  [12] Que vous êtes joli!| [13] que vous me semblez beau! » |

So we find this text printed in *French Intonation Exercises* (p. 82). The piece is marked off into sense-groups in this way, each being numbered, in order that the intonation marks, which are also numbered on the opposite page, may be identified with the groups to which they refer. The opposite page is as follows:




" A thick dot represents the final syllable of a tone-group, and signifies at the same time that this syllable is to be slightly accented." " A small ring in place of a thick dot gives special prominence to the syllable." The continuous horizontal line represents a pitch below which syllables only drop when they are specially low. It is merely a guide, the lines and dots representing approximately the actual pitches of the syllables.

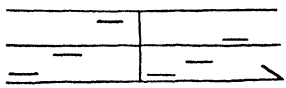
It is obvious that this method is too complicated for ordinary use in class, though the teacher will do well to work with it in the book specified. The " all-dot " system which precedes it in the book in question is equally cumbersome, though perhaps somewhat clearer. We do not propose to give the whole piece represented in this way. We merely give the title:




This method is clearer because there is no doubt about the pitch of each syllable. It may very well be used incidentally by the teacher in class

to illustrate a particular piece of intonation from time to time. But it cannot be advised for ordinary and frequent use.

The method of Monsieur Stéphan, as used in his B.B.C. handbooks for central schools, as well as in *Colloquial French for the English*, would represent our title as follows:



There is a point of disagreement between this system and the last. Apparently the bottom line of Monsieur Stéphan's diagram corresponds to the single horizontal line of the previous diagram. But Monsieur Stéphan does not carry his last dash below this line. Perhaps he might argue that the direction of it (slanting downwards) indicates a still lower drop, though this is not shown. Further, Monsieur Stéphan's system fails to show the special emphasis on the last syllable. The slanting line, without any additional explanation, can only be taken to mean a glide downwards in pitch. This, however, is specially condemned by Messrs. Klinghardt and Fourmestraux, our greatest authorities in this matter, though it is a characteristic of English final syllables. " The intonation of this final word-group," they tell us, " differs from that used in the final word-group of the English sentence, for in the latter the voice ' glides ' downwards (the *legato* of the singer), whereas in French the voice ' jumps ' down to the final level tone. At the end of English sentences this final tone is usually gliding, and not level as in French."[1] Monsieur Stéphan is doubtless confusing emphasis and pitch. Aware of that " alighting " of the voice which is involved in emphasis, he attempts to represent it by a line slanting downwards—which, however, unless a special interpretation is given to it, must indicate a gliding down in pitch. Needless to add, then, we do not consider Monsieur Stéphan's method ideal. The " dot " method previously illustrated is much more in harmony with the facts; and if any given dot is thickened to indicate special emphasis where required, we have here a very satisfactory system. But, as we have already said, this meticulous attention to detail, though useful for the teacher and perhaps for occasional illustration of special passages, is more than is necessary or desirable for ordinary class work.

We now give our own method of marking the passage.

**Le Corbeau et le Renard**

Maître corbeau, sur [un] arbre perché,
[Tē]nait en son bec un fromage.
Maître renard, par l'odeur alléché,
Lui tint à peu près ce langage:
« Hé! bonjour, monsieur du Corbeau,
[Que] vous êtes [jo]li! [que] vous me semblez [beau!] »

[1] *Op. cit.*, p. 13.

It must be understood that this rendering is not the same as that given by Messrs. Klinghardt and Fourmestraux. The version given by these writers is rather the " conventional " one. It represents how any ordinary Frenchman would read the piece without striving for special effect. Our version, however, is made from the record of an actress of the Comédie Française who introduces many rhetorical variations from the normal. The title, of course, is much the same as in the other case. But she begins at once by raising her voice more than is usual on the first syllable, probably to call attention at once to the crow. The emphasis and raising of the voice specially on *un* is also her peculiar device. The same remark applies with respect to her treatment of the first syllable of *Tenait*, as well as in other cases, which the reader will notice for himself. Lastly, her treatment of *Hé*, *bonjour* is so special as to call for a modification of our method of marking. In each of these words, her voice starts with a rather high pitch and then glides up and down. This gliding, as we have already noted, is unusual in French, though common in English. We are therefore justified in using an unusual method of marking. It may be remarked that, where phonetic transcripts are used, these can be marked in the same way as the ordinary texts by our method.

We now give as a further example of our method of marking the concluding section of La Fontaine's fable, *Les animaux malades de la peste*.

*l* L'[âne] vint à son tour, et dit:| « J'ai souvenance
*l* Qu'en un pré | de moines| passant,
*l* [La] faim,| l'occasion,| l'herbe [tendre], et, je pense,
*l* Quelque diable aussi me poussant,
Je tondis de ce pré la largeur de ma langue;
Je n'en avais [nul] droit, puisqu'il faut parler net. »
A ces [mots], on cria [haro] sur le baudet.
Un loup quelque peu [clerc] prouva par sa harangue
Qu'il fallait dé[vou]er ce maudit animal,
Ce [pe]lé, ce [ga]leux, d'où venait tout leur mal.
*acc.* Sa peccadille fut jugée un cas pendable.
Manger l'herbe d'autrui! quel [crime] abominable!
[Rien] que la mort n'était capable
D'expier son forfait. On le lui fit bien [voir.]

Selon que vous serez puissant ou misérable,
Les jugements de cour vous rendront [blanc] ou [noir.]

This extract is marked not according to "conventional" treatment, but according to the highly rhetorical rendering of a Comédie Française actor.

### Presenting a Gramophone Lesson

Not many years ago, it was considered absolutely necessary that the teacher of French should have passed a considerable time in France, or at the least in the company of French-speaking people. It is still desirable that a teacher should go to France from time to time—if only to get something of the necessary "atmosphere". But the need to go there for the spoken language is no longer so pressing. The teacher who possesses a number of records such as those to which we have referred has a bit of France continually available. And, if he makes use of them in the ways indicated, he will get more profit from them than from visits to France. Even the conversations one may get with French people can scarcely be so profitable as the study of suitable records. During a conversation one's attention is largely focused on the ideas, persons, and things involved. The essentials of pronunciation and diction are in the background. The field of thought and the forms of expression are ever shifting. But with a record, one has the same forms of expression ever ready at one's disposition. One can repeat them over and over again, studying all their details and completely mastering them. No living French person could ever give one this advantage. No living French person could say the same thing twice in *exactly* the same way. And if one desires to study minutely a given form of expression, it is highly desirable that it should remain exactly the same throughout the examination. One can stop the gramophone at any point and repeat a given word or series of words as many times as one considers necessary. There is no reason, therefore, why a teacher who is already grounded in phonetics should not go on to study the spoken language until he has a thorough acquaintance with all its subtleties. By all means let him not refrain from going to France, from meeting French people, from listening-in to French on the wireless. These will prove to be refreshing and interesting variations in his studies. But they will rather provide opportunities for using his newly-acquired powers than for increasing them. His steady, patient study of gramophone records will be the most important means of improving his acquaintance with spoken French.

It is, of course, assumed that, having thoroughly studied a record, the teacher will himself repeatedly practise the recitation of the piece. One can easily accustom oneself to listening more or less passively to records without acquiring a corresponding facility in reproducing them with one's own voice. The sooner one gets to this latter stage, the better; though it is well to listen passively for a time, making sure of the model, and fixing its peculiarities by markings of the text, before attempting to give it unaided. If one begins to recite too soon, one may make initial errors which will tend to persist—even sometimes to the extent of causing one to fancy that they exist in the original.

When the teacher has prepared himself by study of a record in the way described, he is in a position to introduce the work to his class. But, before the gramophone is used, the piece must be carefully studied by the pupils for its meaning and general drift. The pupils cannot concentrate on the details of intonation and accentuation, unless the words and their meanings are thoroughly known. In this introductory work, the teacher will take a leading part. And the fact that he has already thoroughly prepared the piece will prevent him from doing any serious violence to the diction during this preparation.

The piece being thoroughly understood by the pupils, the gramophone record may be turned on, and repeated several times. The work of marking it in the way described may now be begun. It is good to let the pupils take an active part in this. The teacher may discover that some of his pupils have better ears than his own. He turns on the whole, or a convenient portion, of the first sentence, and repeats it several times. He may then ask for suggestions as to the marking of special syllables. (Of course he has already explained how he proposes to mark words—taking a few common sentences or phrases as examples.) If there is hesitation, he may even direct the attention of the pupils to certain individual words or phrases, asking them to listen carefully as certain syllables are reached during further repetitions. Having himself previously studied the piece, and marked it, he is able to control the suggestions of the pupils, and to guide them in the most profitable directions. When, finally, the syllables to be marked have been decided on, the whole class may be directed to put in the required signs. In the early stages, the pupils may be somewhat slow in responding with suggestions, and it will take quite a long time to mark a few sentences. If the teacher desires to complete a certain amount within the lesson period, there is no harm in dictating the markings of some of the latter part. The whole piece to be dealt with having been marked, the teacher turns on the record once again, while the pupils follow on their marked texts, listening very carefully to make sure that their markings are in harmony with what they hear. Often, during this process, a bright pupil with a good ear will call attention to some error in the marking, to some slight improvement which may be made, or to some additional syllable which might well be marked. The writer has had interesting discussions—and sometimes disputes—with his pupils at such times as these. When, finally, the whole of the marking has been definitely fixed, the pupils should read through the piece simultaneously, phrase by phrase, after the teacher. (Here, once again, the teacher's previous preparation of the piece will be of great assistance to him, though, if he is not quite sure of himself, he may turn on the record again at the place required.)

The pupils will now be required to practise the reading of the piece as homework. With the markings which they have made, they should be able to preserve with fair fidelity the rendering which they have heard.

And when the next lesson of the same kind comes round, they should be called upon to read individually.

### General

Of course, the more the pupils can hear the record, the more "safe" they become. But there is a limit to what can be done in class. There are, however, in many schools "odd times" when the keener pupils can be allowed to listen to further repetitions by themselves. The writer has adopted the practice of appointing two of the pupils in each class as gramophone monitors, and fixing a time (different for each class) during the midday interval when these pupils can obtain the gramophone and turn on the record for the benefit of all those who care to come to listen. Pupils brought up in this way arrive at a diction which is thoroughly French in all respects. The writer is reminded of pupils who, after nine months of work, were able to recite *La Marseillaise* before a university professor of French, himself a Frenchman, who could find nothing which would not do credit to little Parisians of the same age. And some of his senior pupils have been able to render classical extracts with even better effect—due to their long and careful imitation of excellent models—than when the same extracts were given on the wireless.

If the matter ended here, perhaps one might be inclined to belittle it as over-concentration on details which are not of prime importance. But it means much more. The keenness which is engendered in the diction spreads through the whole subject. The pieces dealt with live with their full meaning in the minds of the pupils, becoming centres of complete power in French which spread their influence far beyond themselves. Many of the records deal with portions of plays which can be acted in costume. This, of course, adds still further reality to them. And when they are produced at Christmas entertainments, and on other occasions, they are not the fearful productions which are so often heard—fit only for those English parents who can merely follow the actions—but plays which would interest to the fullest extent a French audience, if only it could be procured!

At such performances, there is no reason why French songs should not also be sung. Anything which gives the pupils additional motives for careful preparation should be pressed into the service. Let it be clearly understood, however, that French songs are much easier tasks than French recitations, since for the former only pronunciation is required. Indeed, some of the simpler songs can be introduced to the pupils before all the vowels have been acquired. The well-known round, *Frère Jacques*,[1] for instance, requires, with the exception of two nasal vowels and the indispensable ə, only a knowledge of the eight "fundamental" vowels. It has, further, no difficult or exceptional consonants. Yet the author heard it being sung by the pupils of a famous secondary school at their Christmas entertainment with the pronunciation ʒæk, instead of ʒɑːk,

[1] Given in many first French books, e.g. in that of Mackay and Curtis.

i.e. with a vowel which does not exist in French! If plays or songs are given at all, they should be *absolutely perfect* with respect to pronunciation and diction. There is no excuse for anything less. *Little and good* should be the motto. Nothing should be given which would not captivate a French audience. A few verses of perfect French are better than a whole play of English approximations.

Sometimes a piece of verse can be both recited and sung. *La Marseillaise* is a good instance. Messrs. Pathé have a record of the recitation done by an actor of the Comédie Française in the most florid style—a rendering which will tax all the powers of the pupils to imitate with regard to its " expression ". The same firm have also a record of the singing of this famous song, done by a performer at the Opéra of Paris. The second record is not so necessary for class work as the first, since, with a copy of the music, one can readily learn to sing without a model.

A good deal of discussion has occurred from time to time with respect to the use of phonetic symbols. Some advocate using them exclusively for the early lessons, so that the pupils are not tempted to pronounce French words as they are spelled. Others discourage their use altogether, affirming that they are an unnecessary addition to the learning process, and that they tend to confuse the children with regard to the ordinary spelling. The writer, during a teaching experience of over thirty years, has found no difficulty whatever in using the ordinary spelling and the phonetic transcripts side by side, as freely as circumstances require. With those who condemn the symbols as an unnecessary addition he has not the slightest sympathy. It is to be more than suspected that these have not the faintest idea of the magnitude of the task of acquiring a good pronunciation. What would one say of a lecturer who set out to describe the towns of the Isle of Wight without deigning to give a name to each? Or of a grammarian who would endeavour to write a text-book on his subject without using any of the ordinary technical terms? These names by themselves, of course, have no intrinsic value. But they are of infinite value in enabling us to label and refer to certain precise things. The labour of acquiring them is as nothing compared with the task of acquiring an adequate knowledge of the whole field in which they are used. And he who objects to the smaller task is scarcely fitted to attack the greater.

On the other hand, there must be no blind worship of the symbols. The symbols are not the sounds. It is the latter which have, above all, to be acquired. And when one finds teachers being satisfied with exercises in transcribing ordinary French into phonetic transcript, one fears that the means are being mistaken for the end. What, for instance, can one say of the following?

" As to the time required to acquire these symbols, it is incredibly short. I tried it personally with a class of fourteen boys whose ages ranged from eleven to fourteen. I explained the symbols for five minutes, at the end of one lesson; a week later, after another five minutes, a boy wrote

correctly and without help, the rather difficult word 'djø' (Dieu)."[1] Five minutes! Five months is nearer the mark; and months of persistent endeavour, if the *sounds* are to be thoroughly acquired. We must come to realize that, if a new language is to be acquired, it must be done in the mouth, not on paper.

Neither has the writer much sympathy with those who prepare long lists of the various ways in which a given sound, represented by a given phonetic symbol, can be represented in ordinary spelling. Such lists may be interesting for purposes of reference. The writer himself has made a fairly complete list.[2] But the great essential is to master the uses of the sounds in ordinary speech. In concentrating on this task, the other details will become known as thoroughly as is necessary.

Similar remarks apply with respect to elaborate rules for liaison (the sounding of the final consonant of one word when carrying on without a break to a vowel which immediately follows) and to cases of elision (the dropping out of a sound, especially of the vowel represented by ə). One frequently finds students greatly exercised about certain doubtful cases (with regard to which even educated Frenchmen often differ), though these students are unable to read even a few lines of French without glaring faults of pronunciation, accentuation, or intonation. In applying oneself in the way we have described to the imitation of the good models furnished by records of French speech, one will acquire the arts of liaison and elision almost unconsciously. To strain after refinements in these matters while one's general pronunciation is hopelessly bad is a ridiculous misplacement of energy.

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## CHAPTER VI

# First Year

And now we may well consider the course which our pupils should pursue in dealing with their ordinary lessons. The first term having been devoted to the acquirement of the essentials of pronunciation, and at least one lesson per week having been ear-marked for further work in diction (with the aid of the gramophone), it is fairly obvious that, whichever of the first books on Direct lines may be chosen, it will not be possible to complete its study within the year. The writer's experience has been that most first French books contain more matter than can be thoroughly learnt within the compass of the First Year. We may assume, therefore, that work with the first book will continue into the Second Year. Its detailed methods, of course, will be largely dependent on the book used. But, in general, we may say that the work will proceed by reading and

[1] Professor Victor Spiers, *Junior French Reciter*, p. 5 of Preface.
[2] See *Elements of French Pronunciation and Diction*, pp. 172–83.

understanding the texts, employing English where necessary to explain words or phrases, *but not systematically translating* the French into English, and working through the exercises on the texts orally and on paper, these exercises being designed to cause the pupils to use the French they have learned in all possible forms and ways.

### Specimen Lesson

Let us take an example of a lesson. The following is taken from Dent's *First French Book.*[1]

19. **Dix-neuf**

Henri **regarde** les hirondelles. La mère **cultive** le jardin. Charles joue **avec** Marie, Louise et Julie. La paysanne cultive le jardin avec la **bêche.** *Qui est-ce que* la grand'mère **porte?** Qui est-ce que la tante regarde? *Qu'est-ce que* Henri mange? Qu'est-ce que la mère cultive?

**Questions.**—Qui est-ce qui regarde les hirondelles? Qui est-ce qui cultive le jardin? Qui est-ce qui mange du pain? Qu'est-ce qui porte des fleurs? Qui est-ce qui porte Paul? Avec qui Charles joue-t-il? Avec quoi la paysanne cultive-t-elle le jardin? Qu'est-ce que Henri regarde? Qu'est-ce que la mère cultive? Qu'est-ce que Henri mange? Qu'est-ce qui est une chose? une plante?

**Thème.**—*Qui est-ce qui, qu'est-ce qui, qui est-ce que, qu'est-ce que*:

— joue? — vole? — est vert? — mange l'herbe? — regarde les enfants? — est vieux? — Henri mange? — cultive le jardin? — la grand'mere regarde? — est agréable? — Henri regarde? — a des roues? — mange du pain? — la paysanne cultive? — beaucoup d'oiseaux mangent?

Now the teacher will not be content with merely having the books opened and reading through this lesson. He will have looked through the lesson beforehand, noting the new things to be learnt. These are the words printed in heavy type in the first paragraph, and the expressions printed in italics. There is a picture of spring to accompany this lesson, as well as those which precede and follow it; and this will be displayed before the class. Each book has also a copy of the picture which can be drawn out and displayed side by side with the text. But at present this will not be used. It will be necessary only later, when the pupils are revising the lesson, and preparing the exercises upon it. Books will be closed, and all eyes will be on the teacher.

He will begin by announcing the number of the lesson—*Leçon dix-neuf*, and writing the number, 19, on the blackboard. He may also write the words and add the phonetic transcript (diz nœf). There is no harm, if the teacher is fluent with his French, in saying somewhat more than is strictly necessary for the lesson. Even if the scholars do not understand all of it, they may pick up bits here and there. The teacher can, therefore,

[1] Reprinted from Dent's *First French Book* by S. Alge and Walter Ripman, by permission of Messrs. J. M. Dent & Sons, Ltd.

say—*Nous avons jusqu'ici étudié dix-huit leçons; maintenant nous allons commencer la dix-neuvième.*

Turning to the picture, the teacher points to Henri and to the swallows (which have already been noted and named in previous lessons). He points from Henri to the swallows, and says: *Henri regarde les hirondelles.* He can now write the new word, *regarde*, on the blackboard, together with its phonetic transcript (rgard). If the teacher has given his pupils French names (in order to impart the French atmosphere, and also to avoid the difficulty of switching from one language to the other), he can say, *Charpentier ne regarde pas Tisserand; il regarde Henri et les hirondelles* (the negative has already been dealt with in a previous lesson). He can also—once again using a little liberty to go beyond the words strictly to be dealt with—point to himself, and say, *Moi, le maître, je regarde la classe.* Then turning to the picture, he can say, *Maintenant, je ne regarde pas la classe; je regarde Henri et les hirondelles.* The bright pupils will long ago have guessed the meaning of *regarde.* There is, however, nothing to be lost, and perhaps something of certainty to be gained, by interpolating the English (*is looking at*, *watches*).

After dealing in similar fashion with the next sentence, and emphasizing the new word, *cultive*, the teacher comes to the sentence, *Charles joue avec Marie, Louise et Julie.* Here, the best and shortest way is to give the meaning of *avec* (*with*) at once. By all means, put the word into other sentences, such as, *Boulanger est avec Vigneron; il n'est pas avec Tavernier.* But there is little to be gained by giving a number of sentences in which the pupils may or may not seize the meaning of this word. Make sure of the meaning by " rapping out " the English, and then proceed to use the word in other sentences.

There is a certainty and fixity about the meaning, when we fall back on the English, which cannot be obtained in any other way, and which need in no way interfere with the direct use of the French word in succeeding sentences. We cannot afford to dispense with the precision of meaning which has grown up with regard to so many words as a result of the past experience of the child in connexion with his mother tongue. To " beat about the bush " with a number of French sentences containing the word in question, congratulating ourselves that we are avoiding English altogether, is a mistaken policy. Mr. Ripman does not appear to agree with this. He writes as follows:[1] " The force of the prepositions may be taught in the following way. The teacher says to a pupil: ' Point to la mère—I am going to tell you where she is: La mère est dans le jardin. Repeat this sentence!' " He then goes on to further applications of *dans*, avoiding the English word *in*. As a matter of fact, he has used more English in instructing the pupil as to what to do, and as to what he is going to say, than would be involved in merely pointing out the mother and the garden, saying, "La mère est dans le jardin," adding "*dans* means *in*," and proceeding immediately to further French sentences containing the word *dans*.

[1] *Hints on Teaching French* (Dent), p. 30.

## The Treatment of Qui est-ce qui, Qui est-ce que

The same anxiety to avoid the corresponding English leads to needless complexity and, indeed, to needless use of English in dealing with the expressions:

| | |
|---|---|
| Qui est-ce qui | Qu'est-ce qui |
| Qui est-ce que | Qu'est-ce que |

Let us consider the best method of dealing with the matter. The pupils should know what an Interrogative pronoun is, and what a Relative pronoun is. They should know that in English we use the same forms for both kinds of pronouns:

*Who* for the " Person Subject " (whether Interrogative or Relative).
*Whom* for the " Person Object " (whether Interrogative or Relative).
*Which* for things, whether Subject or Object.

If the pupils do not know these things, they should be instructed in them as quickly and as directly as possible.

They should now be told—in simple and direct English—that the French have the forms *qui* and *que* which can be used both as Interrogative and as Relative pronouns, but with the following differences:

| INTERROGATIVES. | | | RELATIVES. | |
|---|---|---|---|---|
| Persons. | Things. | | Persons. | Things |
| qui | que[1] | Subject | qui | |
| | | Object | que | |

Or, to put the matter in another way, we may say:

As Interrogatives:

*Qui* stands for *Persons*, whether Subject or Object;
*Que* stands for *Things*, whether Subject or Object.

As Relatives:

*Qui* stands for the *Subject*, whether Person or Thing;
*Que* stands for the *Object*, whether Person or Thing.

Now in French each of the Interrogative Pronouns can be replaced by a " long " form, as follows:

INTERROGATIVES—LONG FORMS

| Persons. | | Things. |
|---|---|---|
| Qui est-ce qui | Subject | Qu'est-ce qui |
| Qui est-ce que | Object | Qu'est-ce que |

[1] Que, as an Interrogative, however, can be used as Subject only with the verb *être*, e.g. qu'est-ce? (what is it?). With any other verb, the " long " form (which involves *être*) must be used: e.g. Qu'est-ce qui tombe? (what is falling?)

To understand these forms, it is necessary to realize that, although we call them the " long " forms of the Interrogative Pronouns, they are really phrases containing the short forms of the Interrogative and Relative Pronouns just studied.

| (Interrog.) (Rel.) | | (Interrog.) (Rel.) |
|---|---|---|
| Qui est-ce qui . . . ? | = | Who is it who . . . ? |
| Qui est-ce que . . . ? | = | Who is it whom . . . ? |
| Qu'est-ce qui . . . ? | = | What is it which (Subject) . . . ? |
| Qu'est-ce que . . . ? | = | What is it which (Object) . . . ? |

It is well at this point to clear up the confusion which may arise in connexion with two such questions as the following:

*Qu'est-ce que Henri mange?*
*Qu'est-ce que Henri?*

The first of these is straightforward, and needs no explanation. But what of the second? The best explanation seems to be that *est* is to be understood at the end. We then get—*What is it which Henry is?*—in other words, *What is Henry?*[1]

When the matter has been explained in this way, the section headed " Questions " in Lesson 19 should present no difficulty. And, lastly, the " Thème " should be attacked. The pupils are here required to put the appropriate long form of the Interrogative in place of each dash. This might be done orally in class. But, also, it might be set as a recapitulatory written exercise for home work. And the pupils might in this case be required to write an answer to each question.

This is a good example of the sort of work which may be done at home. A child cannot dodge a written task. And the neatness of it is some evidence of the care which he has bestowed on it. Further, if he has attended to the lesson, there is no reason why he should make any mistakes at all. In general, written work in French should be of this nature. It should be well within the child's capacity. And it should, as a rule, be perfect. The great rule in this matter—as in the teaching of spelling in English—is to minimize the possibility of mistakes. Pupils should write only what, by reason of their previous study of French, they are sure of.

It is not to the point to say that, in writing what they know already, the children are making no progress. The great thing to remember in teaching a foreign language is that facility is the most important thing. A French child who knows 1000 words and uses them with readiness may be said to have a better knowledge of the language than an English student who can read a French book and make out the meaning of 5000 words without the use of a dictionary, but who cannot speak or write

[1] This may be sufficient for the present. But, as soon as possible, it should be explained to the pupils that in French our Nominative " after " the verb *to be* is rendered by a word tin the Objective or Accusative form; e.g. *Je le suis* (I am he).

with any fluency. We should aim at something approaching the " grasp " of the French child before going on to make the mere acquaintance of a large vocabulary. *Qui trop embrasse mal étreint.*

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## CHAPTER VII

# Second Year

And when the pupils go on to a Second Year course, the same principles should govern the work. The pupils should increase their power in French by " ringing the changes " on pieces which have already been presented to them as models. Let us take as an example one of the lessons from Dent's *New Second French Book.* On p. 19 of this book we find the following:[1]

### 6. Erreur d'un paysan

Un paysan portait un jour une corbeille de poires dans un grand château. A la porte il trouva deux **singes** qui étaient **vêtus** comme des enfants. Leurs habits étaient très beaux et **brodés** d'or; ils avaient aussi une petite **épée** au côté et un chapeau sur la tête. Ces animaux se jetèrent sur la corbeille du paysan, qui ôta **respectueusement** son chapeau et **se laissa** prendre la plus grande partie de ses poires. Le maître du château, voyant la corbeille **presque vide,** demanda au paysan:

« Pourquoi n'as-tu pas rempli la corbeille? »

« Monsieur, » répondit le bon paysan, « elle était bien pleine, mais messieurs vos fils ont trouvé les poires de leur **goût,** et je n'ai pas eu le courage de les leur **refuser.** »

The words printed in heavy type are new to the pupil, and they are explained under the text in French. Thus, we find:

**une erreur:** quand l'élève prend un adjectif pour un verbe, c'est une erreur. **le singe,** animal qui a quatre pattes; il ressemble à l'homme. **vêtir,** couvrir d'habits.

In almost all these cases, the French explanations leave the meanings more or less vague and uncertain. The word *erreur*, of course, suggests the corresponding English (*error*) at once. If it were not so, a pupil might be inclined to conclude from the explanation given that **erreur** is necessarily connected with grammar. In the case of **singe** and of **vêtir,** the lack of similitude with the corresponding English will throw the pupil back on a French explanation which lacks the necessary precision.[2]

[1] Reprinted from Dent's *Second French Book* by S. Alge and Walter Ripman, by permission of Messrs. J. M. Dent & Sons, Ltd.

[2] The word *vêtir*, of course, can be connected with the English *vestment* and *vesture*, which come from the same Latin root (*vestis*).

In all cases, therefore, it is well to make sure that the proper meaning is seized by "rapping out" the equivalent English. This done, there is no harm in giving the French explanations. But these will be more useful as practice in French than in giving exact indications of the meanings.

The text we have quoted is followed by three exercises. The first of these bears on the verb **demander** and other verbs like it which take a dative. It requires all nouns in certain sentences cited (most of them drawn from previous lessons) to be replaced by pronouns, and begins as follows:

A. Remplacez les substantifs par des pronoms.

(1) Le chasseur demanda à l'étourneau . . . (2) Le fils ressemble au père. (3) Le père demanda à la fille . . . (4) La jeune fille apporta le livre à son frère. (And so on.)

We next have an exercise on the use of **comme** and **comment,** as follows:

B. Comme, comment.

(1) Les singes étaient vêtus —— des enfants. (2) —— s'appelle ce garçon? (3) Il travaille —— une abeille. (And so on.)

The pupils are required to fill in the appropriate word in each sentence.

Lastly, there is an exercise on adverbs, as follows:

C. Ajoutez des adverbes.

(1) Le monsieur ôta son chapeau. (2) Le bœuf marche. (And so on.)

In only one or two cases is the work set directly connected with the text just read. It is quite good, of course, to set exercises on previous reading. But more might, we think, be made of the text now in question. The following exercises might be set.

The pupils might be asked to rewrite the piece, supposing that the peasant himself tells the tale, as follows:

Mon Erreur

Je portais un jour . . . je trouvai . . . Ces animaux se jetèrent sur ma corbeille . . . (And so on.)

Next two peasants could be supposed, instead of one, as follows:

Erreur de Deux Paysans

Deux paysans portaient . . . ils trouvèrent . . . Ces animaux se jetèrent sur leur corbeille . . . (And so on.)

Then this could be put in the first person, as follows:

Notre Erreur

Nous portions . . . nous trouvâmes . . . Ces animaux se jetèrent sur notre corbeille . . . (And so on.)

If considered necessary, still further exercises can be devised. For instance, after the first sentence, the pupils could be required to drop into the present tense, as is often done for the sake of vividness, as follows:

. . . A la porte, il trouve . . . (And so on.)

And the same changes in person and number can be rung on this version as on the first one.

The pupils need not be required to write out the whole text in full on each occasion. They may be allowed to put a few dashes where words remain as before. But note that, in order to make the necessary changes, they must carefully reread the piece, and understand it, on each occasion.

They may finally be asked to tell the tale orally. In doing this, they might be allowed to make any slight changes in the wording which they choose, provided, of course, that they are sure of the correctness of the French used. A child, for instance, might be commended for beginning as follows: " Je vais vous conter une petite histoire. C'est l'histoire de l'erreur d'un paysan. Un jour ce paysan portait une corbeille de poires dans une grande maison . . ." (And so on.)

In such ways as this, the pupils will gradually acquire the power to use simple French. But in all cases they should be advised to adhere to the form of the original, unless they are certain, in the light of their previous study, of the changes they propose to make.

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CHAPTER VIII

# Third Year

And in the Third Year, the work should proceed on similar lines, though of a more advanced nature.

### Specimen Lesson

Let us take as an example a lesson from Dr. Hedgcock's *Junior French Composition*:[1]

**Une Bouchée de Pain** (suite)

Le boulanger prend une certaine quantité de farine; il y ajoute de l'eau pour en faire une pâte. A cette pâte il mélange du levain qui, en fermentant, dégagera les gaz qui feront lever le pain. Il pétrit la pâte longtemps et de toute sa force; il en prend des morceaux, les travaille avec ses mains, les rejette violemment dans le pétrin, car il faut que tout soit bien mélangé. Puis il prend des masses de pâte, les pèse et leur donne la forme des pains qu'il veut faire. . . .

[1] In two volumes, the second being a companion to the first. This extract is reproduced by the courtesy of Messrs. G. Bell & Sons, Ltd.

This is part of one of the extracts of Volume I. At the end of the book are some *notes explicatives*. Thus, we find:

**la pâte:** la pâte est molle, le pain sera dur.

Once again, we may repeat that mention of the corresponding English (*paste*, *dough*) will give precision and certainty to the meaning.

With these *notes explicatives*, Volume I could be used as a reader. And quite a good reader it would prove. "But the principal aim of the book is to teach pupils in their third or fourth year to write French by conscious imitation, leading to invention." [1]

If we stop short at the first volume, we lose far more than half the value. One may read hundreds of French books without acquiring any considerable power in expressing oneself in the language. Accordingly, the second volume should be used concurrently with the first. In this book, we get such exercises as the following:

1. Complétez avec **y** ou **en:** (*a*) Il prend une boîte et —— met la craie. (*b*) Il creuse un sillon et —— jette le grain. (*c*) Elle coupe du blé et —— fait une gerbe. (And so on.)

2. Exemple: **Il marche dans le champ et jette du grain dans les sillons. Il marche dans le champ** *en jetant* **du grain,** &c. Remplacez les mots en italiques par **en** et un participe présent: (*a*) Les pierres tournent *et écrasent* le blé. (*b*) Les coquelicots *poussent et* empêchent le blé de bien venir. (And so on.)

3. Complétez:

   (*a*) Il faut que les enfants (avoir) du pain.
   (*b*) —— —— le pain (être) bon.
   (*c*) —— —— nous le (manger). (And so on.)

4. Remplacez les noms en italiques par des pronoms personnels: Le boulanger prend des masses de pâte, *le boulanger* pèse *les masses de pâte* et donne *aux masses de pâte* la forme des pains que *le boulanger* veut faire. (And so on.)

5. Faites des phrases à l'aide des mots suivants: (*a*) Le paysan — enfoncer — soc — sillon. (*b*) Les oiseaux — venir — champ — manger, &c. (And so on.)

6. Racontez l'histoire d'une bouchée de pain depuis le champ où on sème le grain jusqu'à la table où on sert les jolis pains dorés.

Let no one complain that with so many exercises, some of them seemingly rather trivial, we are wasting valuable time, and not "getting on" with the subject. To deal with each of these exercises, the pupil is compelled to read and reread the extract, thoroughly grasping the meaning and significance of each word. Further, it is only by *using* the various forms required that the pupil can acquire any real power in the language. And lastly, in such exercises as these, the pupil is living and

[1] *Op. cit.*, Preface, p. vi.

moving in an atmosphere of correct French. If he gives due attention to what he is doing, he cannot go wrong to any appreciable extent.

**The Subjunctive**

It will be noted that one of the exercises is on the subjunctive mood. By general consent, it seems to be the practice to defer the serious treatment of this mood until the Third Year. And some teachers are disposed to avoid it altogether in the earlier years. A similar attitude is also frequently adopted during the First Year with respect to all tenses but the Present and with regard to irregular verbs. Such prejudices are relics of the old system of beginning with grammar and working translation exercises carefully arranged—not to bring in the French of real life, but to provide suitable material for the stage to which the pupil has progressed in his systematic absorption of the grammar. One would have thought that such careful choice of " suitable " French would ere this have ceased by reason of the ridicule poured upon it in popular journals by those who have suffered from it in their school days. " Has the master paper? No, he has pens. Hast thou good butter? No, I have only cheese and eggs." These are actual sentences to be translated into French as exercises on " the partitive article " in a well-known book.

We must come to recognize that, so long as the ideas expressed are clearly comprehensible to the pupil, there need be no hesitation on account of tense or mood or " irregularity ". We should introduce the pupil as soon as possible to the common forms of expression, whether these are labelled " irregular " in the grammar books or not. To the young French child, unsophisticated by grammatical training, there are no irregular forms. *Venez* is just as regular as *marchez*. So should it be with our pupils—until they have made sufficient progress to profit by distinctions between regular and irregular forms. And since the subjunctive mood occurs in many everyday expressions, we are scarcely right in avoiding it for two years. We should not refuse to deal with a piece of ordinary French, otherwise suitable, because it contains a verb in the subjunctive mood. We should bear in mind that this mood exists also in English. Indeed, we may say that it has a wider use in English than in French—though by no means such a frequent one.

> *If it were done when 'tis done, then 'twere well*
> *It were done quickly.*

This sentence contains no less than three subjunctives. But the corresponding French would require only the last of the three verbs in question to be put in the subjunctive (*il serait bon que ce fût vite fait*).

It must be clearly understood that we are not advocating a thorough study of the subjunctive in French during the early stages. We merely assert that it should not be completely avoided. Take such a common English sentence as, *I want him to come*. Surely the corresponding French (*Je veux qu'il vienne*) should not be kept back until the Third Year. The

teacher can explain to the pupils that the French never use a form like the English one; that they say, *I want that he come*. It can readily be pointed out that whereas *he comes* is the indicative mood, *he come* (though, of course, not common) is the subjunctive mood. There are a few cases in English where we use the subjunctive in the same way as the French. *I beg to ask that permission* **be** *granted to do so*. Although, as a matter of fact, the French would probably not cast the corresponding sentence to this in the same form,[1] we have here a type of many French sentences in which the subordinate sentence is put in the subjunctive mood. And a sentence like this could be cited as explanatory of French usage.

Sooner or later the rules of the subjunctive in French, as enumerated in any good grammar, must be thoroughly mastered. We quite agree that this should be done comparatively late in the course. If, however, the subjunctive has not been avoided during the early stages, but welcomed and explained as thoroughly as circumstances permit, this last stage will be largely recapitulatory.

Even when the rules have been mastered, it must not be thought that the matter is settled. The most important thing is to give practice in the use of the subjunctive. The pupils, for instance, might be asked to complete the following:

| | |
|---|---|
| On sait / Il est certain / On dit } que (qu') | On demande / On désire / On veut / Il faut / Il n'est pas vrai } que (qu') |
| je finis mon devoir. | je finisse mon devoir. |
| je suspends mon chapeau. | |
| tu descends. | |
| il répond bien. | |
| ils sont ici. | |
| vous obéissez. | |
| (And so on.) | |

Or an exercise like the following[2] could be given:

Complétez:

(*a*) { *C'est un voleur.*
Je ne crois pas que ——.
Je ne croyais pas que ——.

(*b*) { *La dame a peur.*
Il ne faut pas que ——.
Il ne fallait pas que ——.

[1] *Je serais très obligé d'avoir la permission de le faire. Je prends la liberté de demander la permission de le faire. Je vous prie de m'accorder la permission de le faire.* Probably one of these forms would be considered more suitable in French.

[2] Reproduced from Dr. Hedgcock's *Junior French Composition* (Vol. II, p. 41) by courtesy of Messrs. G. Bell & Sons, Ltd.

(*c*) Avant que ma mère *pouvoir* les voir, elle s'écria, " Ce sont des voleurs ".

(*d*) Je suis heureux que les ours *être* partis. Nous étions heureux que les ours ——.

(*e*) Le postillon fouette les chevaux pour qu'ils *aller* plus vite.

Le postillon fouetta ses chevaux pour qu'ils ——.

It is useful to find or to compose a piece which gives a number of examples of what we wish to teach. The following is a good example with regard to the subjunctive.[1]

### Observations d'un maître à ses élèves

Albert, je veux que vous arriviez à l'heure, entendez-vous?—Jules, je ne veux pas que vous vous couchiez sur la table.—Pierre, il est impossible que vous écriviez bien si vous tenez ainsi votre plume.—Henri, je ne vous punis pas quoique vous le meritiez bien.—Louis, il est inutile que vous mettiez votre nom au bas de la page, il est déjà sur la couverture de votre cahier.—Dites à Simon qu'il ne faut pas qu'il réponde avant son tour.—Il faut que tous les élèves sans exception lisent soigneusement les notes et en apprennent quelques-unes.—Que Paul vienne me parler; il n'est pas juste que je le punisse s'il ne l'a pas mérité; qu'il cesse de pleurer; s'il est innocent il ne sera pas puni.

**Exercise 1**.—Conjuguez: Il faut que j'écoute bien. Il faut que j'apprenne bien mes leçons. (And so on.)

2. Remplacez les infinitifs par des subjonctifs: Je veux qu'il (*venir*) avec moi. Je désire qu'il (*apprendre*) le français. Il faut qu'il (*finir*) son devoir. (And so on.)

It is rather unfortunate that in some cases the present subjunctive is the same as the present indicative. In the first conjugation, which includes the greater part of French verbs, the three persons of the singular and the third person plural are, of course, the same in each case. But the teacher should not utilize this similarity to avoid mention of the subjunctive. Even when the subjunctive is of the same form as the indicative, it should be definitely recognized as subjunctive. Otherwise, the pupils will be tempted to use the indicative in all cases. In this connexion, it may be pointed out that such an exercise as the first of those just given is very helpful. The pupil has to give the whole of the six forms, and will thus realize that he is dealing with a different mood.

[1] Reproduced from *La Classe en Français*, par Gourio, by courtesy of Messrs. Houghton, Mifflin Co. and of Messrs. George G. Harrap & Co., Ltd.

## CHAPTER IX

# Fourth Year

### Preparing for a Commercial Career

In the Fourth Year, many pupils will be in the position of knowing with some definiteness what they desire to do on leaving school. A large number will be hoping to take places in commercial houses. And for these some amount of specialization in commercial French is desirable. A special book on this branch of the language should be used. Dent's *French Commercial Course* will be found both comprehensive and interesting. Unlike most books on the subject, it does not include long lists of commercial expressions with their English equivalents. It contains, indeed, all the necessary expressions; but they are worked into a continuous narrative which is designed to clarify and vivify the subject in such a way that the pupils can thoroughly understand the matters dealt with. In accordance with the principles of the Direct Method, the whole of the text is in French. But difficult words and expressions are explained by footnotes in English. As we have already noted, this is the safest way to assure oneself of precision in meaning. At the end of each chapter there are exercises in French which require the pupil to use the knowledge acquired. At least two periods a week should be assigned to the study of a book of this kind. To " play " with the subject by means of a weekly lesson will not produce satisfactory results.

### Preparing for External Examinations

But some of the pupils in the Fourth Year may have come to the point of aspiring to obtain a School Certificate. For such, it is well to modify the course at this stage. Although many examining bodies have recognized the changes which have taken place in the teaching of French, one still finds a large number of questions which demand translation. However much we may object to the importance assigned to this exercise, we ought not to stand in the way of our pupils' aspirations. It is advisable, therefore, to begin definite exercises in translation for the sake of those pupils who desire to sit for external examinations. It will be found, however, that the thorough grasp of the language which has been obtained by the use of the Direct Method will render the pupils extremely capable in this exercise. The slavish attempts to translate each word or small phrase literally, which are only too common among pupils brought up on " translation " methods, will usually be replaced by efforts to seize the meaning of each sentence as a whole and to render it in the other language—also as a whole.

There are a number of good books which will help the pupil in this transition period. *The Public School French Primer* [1] of Siepmann and

[1] Published by Macmillan.

Pellissier contains good reading material with exercises on Direct lines, and also a fairly comprehensive grammar and full translation exercises. These last being based on the texts which have been read, and being intended for use immediately after the study of those texts, are not likely to produce the impossible combinations of French words which so often result from free translation. The only objection to be made to the book here is that it contains a considerable amount of material which is scarcely advanced enough for pupils of the Fourth Year. The book could well be begun in the Third Year—by those who desire to switch over to some translation rather earlier than we advise.

A more advanced book than the preceding, and somewhat on the same lines, is *Macmillan's French Composition, First Course* (by Eugène Fasnacht). This begins in the spirit of the Direct Method with a number of extracts to be studied and then rewritten in a different person, number, or tense. It then proceeds to give further French passages " on a great variety of topics, each accompanied by a parallel English passage, more or less closely imitated, on the same subject—to be retranslated into French." Lastly, there are some English extracts to be turned into French without any assistance beyond occasional reference to the " Parallel Syntax " which forms the second half of the book, and which consists of a very systematic and comprehensive statement of the essentials of French syntax with a rich supply of examples, English and French being side by side—" parallel "—in each case. There is no doubt that this book can be made very useful to a pupil who is preparing for a " first school " examination. It should not, however, be put in the hands of pupils who are not already fairly well advanced. The syntax should be attacked by the pupils not as a new thing, but largely as revision. They may pick up a good deal that is new. But, unless they are already familiar with a large part, the amount to be learned will tend to discourage them.

Another book which may be used with profit in the teaching of translation to Fourth Year classes is *French Composition by Imitation* by Hubert Brown.[1] Each pair of pages contains first a piece of English with the corresponding French on the opposite side, then two further pieces of English for translation, similar to the first and requiring the same words, phrases, and idioms, but sufficiently different to require a real effort on the part of the translator. At the foot of the second page there are further sentences for translation " based on the most important rules of French syntax, and arranged in systematic order ". The last few lines of the second page are occupied with instructions for " exercises in Free Composition suggested by the subject of the pieces for translation ".

## Continuance of Ordinary Course

For those teachers who can afford to proceed through the Fourth Year undisturbed by thoughts of external examinations, and without the need of specializing on commercial French, a line of development more

[1] Blackie & Son.

closely in harmony with the principles of the Direct Method may be followed. Translation can still be kept at arm's length, and composition based on imitation may be further developed by such a book as *Free Composition and Essay Writing in French*;[1] while the essentials of grammar may be summed up and revised by the study of *Première Grammaire Française*, par Berthon.[2] At the same time, some taste for literature may be developed by the study of a few short classical works—not translating them, but understanding and enjoying them. For this purpose, such books as *Blackie's Little French Classics* will be useful. These cheap little books contain each a biographical notice of the author, notes in English on the chief difficulties, and a questionnaire in French at the end. We are inclined to think that notes in English are preferable to explanations in French. Attempts at the latter are usually vague and prolix, and often leave the young student in doubt. Take as an example the note:

*Trois fois sur quatre*, " three times out of four "

What could be more to the point? As to the questionnaires, they are perhaps somewhat elementary for Fourth Year pupils. Perhaps they are more suitable to pupils of the Third Year. But they are on direct lines and they ensure, at any rate, that the pupil absorbs what he reads.

With a bright Fourth Year which has no special examination in view, it would be exceedingly good to attempt the study of a complete French play such as *Le Voyage de Monsieur Perrichon* (Labiche et Martin)[3] or *Le Bourgeois Gentilhomme* (Molière).[3] Such a play could be produced—in whole or in part—at the end of the year. But this should not be attempted unless the pupils are really good in their diction, and unless they can spend a large amount of time in the most careful preparation, not only of the pronunciation, but of the " tune ". The teacher must be master of this latter, and should definitely indicate the intonation and emphasis *throughout*, in some such way as we have already indicated.[4] If this is done, the production of such a play will give an immense impetus to the work. But, unless the thing can be carried through with the greatest thoroughness, it is best to abstain from it. There is nothing more pitiable than many of the performances, poorly pronounced and still more badly intoned, which are served up to the parents as French in many schools at present.

[1] See p. 136. [2] See p. 155. [3] Blackie. [4] See pp. 171–172.

## CHAPTER X

# Means of Stimulating Work

### Wireless

There are many other ways in which life and inspiration can be imparted to the work. Once a week Monsieur Stéphan gives a lesson in French on the wireless for central schools. M. Stéphan gives instruction in pronunciation and diction, and follows this with a lecture expliquée, the texts being published for each term in a little pamphlet issued by the B.B.C. at the price of one penny. The lessons are suitable for pupils of the Third or Fourth Year. There is nothing that M. Stéphan does which should not be possible to any good teacher of the subject. And the fact that so much importance is attached to hearing him is a sad commentary on the poverty of our teachers on the oral side. The chief value of these lessons, indeed, should reside in their novelty. To know that they are listening to a Frenchman and understanding him with ease should prove a source of inspiration and encouragement to the pupils.

### School Journeys

Another means whereby the enthusiasm of the pupils can be aroused is the organization of school journeys abroad (see Vol. IV, pp. 251, 264). It is usual, of course, to arrange these in the school holidays; and Easter seems to be the best time. They are dependent on the spirit of self-sacrifice of the teachers, and much thought is necessary in organizing them, for it is essential to work out the whole plan of operations beforehand, and it is extremely helpful to produce a sort of guide-book. The School Journey Association is able to obtain considerable reductions in fares. The total cost will vary, according to the distance to be travelled and the accommodation required, between about £3, 10*s*., and £8 per head for a week. The former was the amount required for a trip from the writer's school in London to Le Portel, a little seaside town near Boulogne; the latter for one from the same school, at the same time, to Montreux. Even in comparatively poor districts, much can be done if plans are made well in advance. At the writer's school, many pupils begin early in the year to accumulate funds through the medium of the School National Savings Association. One cannot deny, however, that these journeys require great efforts in preparation. But much good will result from them. Not so much in the way of direct acquisition of French, but rather in the way of interest and of broadening the views of the children. Let us admit at once that, as far as French is concerned, the children will rather use any knowledge and skill they have already acquired than add to their acquirements. Remember that for the greater part of the time they will be talking together in English.

## International Exchange of Scholars

If English children are to get much practice in talking French, they must be more or less isolated from one another, and placed among French people. These conditions can sometimes be obtained by getting families in England and France to make exchanges during the holidays—in this case preferably during the summer vacation. An English family can take a French boy or girl and send their own child to France in return. At present, the number of opportunities for doing this is somewhat limited. There is also considerable distrust and hesitation on both sides of the channel. It is, of course, necessary to be in touch with some known and trustworthy person, who can vouch for the respectability of the family to which the child is sent. The writer has at various times placed many French children in English families. But it is difficult to get the same enthusiasm on both sides at the same time. On one occasion, for instance, Dr. Toutey, who was at the time Inspector of Schools in Marseilles, desired to send a number of children to London under a scheme whereby these children had been awarded small scholarships as rewards for their good work in English. The writer approached the parents of his own pupils, and many families took individual French children for the holiday period. No doubt, the English children profited to some extent from association with their French visitors. But it would have been a better arrangement if London children could have gone out in exchange to Marseilles.

The ideal arrangement would be to make exchanges during term time. If about twenty children from an English school could change places with the same number of French children from a French school for a month or more, and if the teacher of French in the English school could accompany the party and replace for the time the teacher of English in the French school who would come over with his pupils and take French in the English school, we should have an exchange which would be extremely profitable to all concerned. But there is scarcely enough enthusiasm and *bonne volonté* on either side of the Channel to make it possible. The writer communicated with three heads of French schools some years ago in the hope of making a beginning in this direction, but without any success. If our governments would father the idea, perhaps some pairs of schools could be formed to work an arrangement of this kind.

## Foreign Students as Assistants

Meanwhile, we are thrown back on lesser degrees of intimacy with our friends in France. Something has been done in secondary schools and in higher institutions in the way of receiving foreign students as assistants for conversational lessons and giving them in return the right to profit by any of the lessons of the school which they desire to attend. Too much must not be expected from these arrangements. The foreign student is usually inexperienced as a teacher, and all that one can hope for is a little additional practice in conversation. This, of course, may be of

considerable advantage in schools where the modern language teacher is weak on the oral side. But such a state of affairs ought not to exist. A teacher who cannot speak a modern language tolerably well has no right to attempt to teach it. The fact that even the senior classes of central schools are not very advanced is a great disadvantage; and since the number of foreign students desirous of availing themselves of such arrangements is not sufficient to satisfy the needs of our secondary schools, it is unlikely for many years to come that modern schools will get any of these assistants.

### Correspondence

There is one method of arousing interest and promoting mutual assistance between the two countries which is open to all schools—the encouragement of correspondence between English and French pupils. The type of school in France which corresponds most closely to our central school is the École Primaire Supérieure. One of these schools is to be found in almost every town of any considerable size throughout France; and in the larger towns there are several. In many cases, teachers will be acquainted with some of these institutions. Where they are not, information can be obtained by applying to the secretary of the Board of Education.[1] It is advantageous to send all the letters together. The cost of postage is reduced. All the pupils can be stimulated to make an effort to catch the post. And the teacher has some control of the correspondence, knowing, at the very least, which children are writing and which are not. As time goes on, this control will be of still greater value. Many pupils soon get weary of well-doing if left entirely to themselves, and the slight stimulus exerted by the teacher who keeps an eye on the correspondence will ensure that some continue who would otherwise fall out. Perhaps it is best that the pupils should write their first letters in the mother tongue. In this way, there will be little difficulty in making a good start. Further, if they receive a similar letter by return in French, they will have at any rate one fairly good model to help them. Later, when the pupils on either side are writing in the foreign language, it is well for each to return the letter of his or her correspondent duly corrected.

### French Periodicals

A further means of stimulating continued interest in French is the inducement of the children to subscribe to the French periodical *La France*.[2] This paper is specially produced for English school children, and is extremely readable. It is published weekly during the term, and costs 2*d*. per number. Since Education Authorities will not, as a rule, provide literature of this kind, it is not advisable to attempt to follow this suggestion in the poorer schools. All the children in a class should subscribe, if at all. The teacher, who should, of course, read the periodical

[1] Whitehall, London, S.W. 1.
[2] Published by Evans Bros., Ltd., Montague House, Russell Square, London, W.C. 1.

himself, could devote one lesson a week to comments and to the elucidation of difficulties.

Every teacher who is really keen on the subject should keep himself in touch with France and the French by subscribing to some periodical of a more advanced type. Among weekly reviews may be mentioned *Les Annales*. A daily paper which can be strongly recommended is *Le Matin*. This will be sent post free for a subscription of 200 francs per annum. In the south of England, the morning's paper will usually arrive in the evening. The great value of it—beyond the news which it gives—is that one is kept up to the practice of reading some French every day. There are always two *feuilletons*; and, though these are of a somewhat lurid type, the reading of them will help to carry on the habit of regular perusal. Under the title of *Les Mille et Un Matins*, there is usually a short, complete story each day. Every six weeks or so, the writer distributes his old copies among the senior boys. These boys probably do not read very much of them. But even the headlines and advertisements are instructive. Further, the boys realize more fully than they otherwise would do that they are dealing with a living language.

### The School Library of French

The keen teacher of French will spare no pains to form a lending library of French books for his pupils. Where grants for this purpose can be obtained from the Education Authority, a start can be made without difficulty. But in many cases, no help of this kind will be forthcoming. And all possible means should be tried for accumulating a stock of books. Some of the pupils may be able to get a few books from home or from friends. The teacher may himself get some acquaintances to contribute books. And possibly the children may be induced to pay a small subscription. Money thus obtained could be expended in getting second-hand books rather than new ones. It is obvious that in these circumstances one cannot be over-critical with regard to the choice. There must, of course, be nothing of an immoral tendency in them; and the teacher will do well to read through every book before placing it in the library. The books should be interesting, and of varying difficulty. Many tales edited for schools can often be picked up in the second-hand shops at almost a nominal price. The children should be encouraged to read these books in the easiest possible way, i.e. without making a definite study of them. They will require dictionaries for books which have no vocabularies. And they should be induced to get these (if they cannot be supplied by the school) as soon as possible.

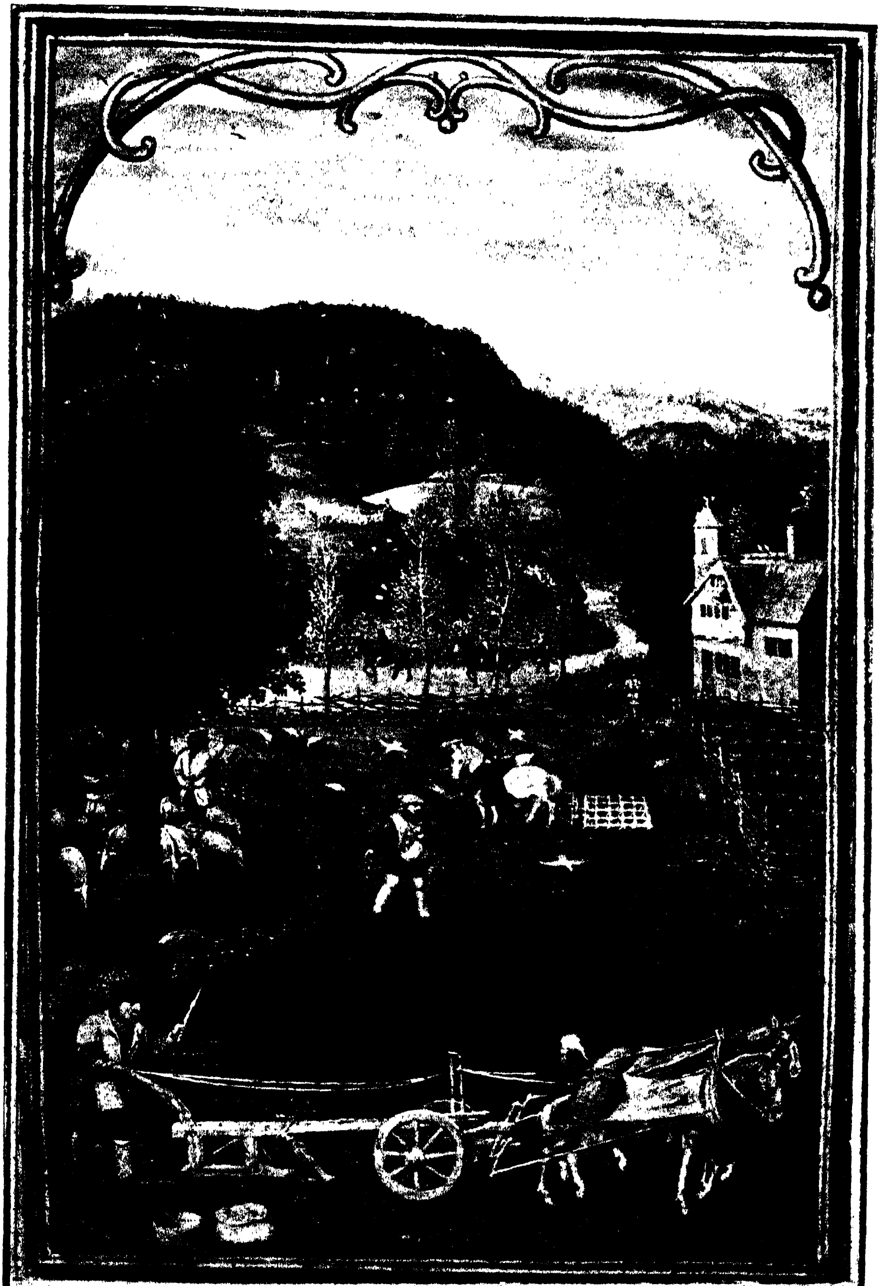
There is no reason why children should not begin to read easy books in their Second Year. In the early stages, the labour of making out the French—even with the bare sufficiency of meaning to keep in touch with the story—will be so great that considerable encouragement may be necessary to induce some pupils to persist. But, if the books chosen have not been too difficult, facility in getting the meaning will increase with

great rapidity up to a certain point. And the pleasure derived from the reading may compensate for the labour involved. The brighter children, at any rate, will come to realize that the reading of a French book need not be so very much more difficult than that of an English one. When once they have formed the habit of frequent reading, they may be regarded as well on the road to become French scholars. It is only by much reading—far more than is possible in lessons—that one can become familiar with a language. Unless the steady, concentrated study of the French lessons is supplemented by much cursive reading, brilliant results will be impossible. However comprehensive and thorough the class teaching may be, we cannot hope that it can cover all the forms of expression which exist in such a highly developed language as French. Every advanced French scholar will probably agree that he has acquired more by his private reading than by the definite instruction he has received in class.

In this subject, as in most others, the teacher's aim should be not to cover the whole ground with the pupil, but to set the latter's feet firmly on the road and to stimulate him to go on by himself. There has been much talk in recent years with regard to the Dalton Plan, a method by which children are induced to undertake the study of large sections of certain subjects in their books by themselves and in the time which they choose. Whatever degree of practicability this plan may have in some subjects, it has a very limited applicability in French during the early stages. If only to secure correctness of pronunciation, the teacher must be in daily contact with the pupil. He can, of course, set the pupil exercises to practise, and he can leave him to put in the practice when he chooses—so long as he does choose. To this extent the teacher may be said to follow the Dalton Plan even in the early stages. But during this period, and especially with eleven-year-olds, there must be no long intervals during which the teacher does not see and hear the pupil. If the latter is to be " kept at it ", he must be in constant contact with his teacher. But, as time goes on, more and more can be left to the pupil, especially in the matter of reading. And if finally the scholar has not acquired the power to study to a large extent by himself, the teacher must regard his work as a failure.

To induce and to assist the habit of private study, some of the larger dictionaries should be available in the school. We have already mentioned a few of these.[1] Several copies of *Cassell's New French-English and English-French Dictionary* should be easily available in the library, and also a few copies of the smaller *Larousse*.[2] The *Larousse Universel* is especially useful, both for the teacher and for the advanced scholars, because it teems with illustrations and because it contains many popular words—some of them slang—which are not to be found in the more classical dictionaries, but which are nevertheless frequently met in the writings of realistic modern authors. Nothing is more annoying and discouraging

[1] See p. 135.
[2] *Dictionnaire Complet Illustré de la Langue Française*, Larousse (Dent & Sons).



CONVERSATION PICTURE

September: Ploughing

*From the Miniature by Simon Bening in the Victoria and Albert Museum, London*

to the earnest student than failure to find a word in the dictionary. Even the *Larousse Universel* will not save the situation on all occasions. Slang is continually changing and growing. And the number of *Dictionnaires d'Argot* which have appeared and which continue to appear are sufficient evidence of the fact that no single volume, however comprehensive, can cover the whole field of French speech. A book of this type should be found among the reference books at the disposal of the teacher and of the senior scholars. We recommend *A Glossary of Colloquial and Popular French*, by Kastner and Marks.[1]

There should also exist for reference one or two fairly full French grammars. Among those written in English we can recommend *Dent's School Grammar of Modern French*. This has the advantage of special sections dealing with the language of the seventeenth century. Many of the older forms of the golden age of French literature still survive, at any rate to the extent of being quoted and imitated. But it is well that the student should clearly distinguish between modern and ancient usage. This book will help him. Among grammars written in French we may specify *Nouvelle Grammaire Française* [2] par A. Chassang, *Cours Supérieur*. This is no longer " new ", since 1884 saw the ninth edition. But this fact alone is evidence of its value.

Lastly, a few of the shorter works on French literature should be at the disposal of the more studious pupils. The *Histoire de la Littérature Française* [3] of Doumic might be procured for advanced pupils; the *Petite Histoire de la Littérature Française* [4] of Faguet is quite a good little book for ordinary purposes; while even the *Petite Esquisse de la Littérature Française* [5] of Mansion will be better than nothing. These books, of course, are not intended for all students of French. Only those who get really interested in literature, and who wish to " place " the authors they read, will find it necessary to make use of them.

### Morning Assembly in French

It is highly important that the pupils should use the French they have acquired as frequently as possible; and, wherever practicable, occasions for this should be provided outside of the French lessons proper. Such occasions provide both a stimulus and a means of practice. In schools where all the pupils learn French, the morning assembly may be conducted in French—at any rate, once a week. It will be necessary, of course, to select one or two suitable French hymns and to devote some of the lessons to the learning of them. The Lord's Prayer in French should also be learnt. And some other form of prayer might be arranged to precede it. The following,[6] for instance, might be used:

Dieu Tout-Puissant, nous t'offrons bien humblement nos louanges pour toute ta bonté. Nous te remercions de cette santé du corps et de

[1] Dent & Co. [2] Garnier Frères. [3] Delaplane, Paris.
[4] Crès, Paris, and Dent, London. [5] McDougall's Educational Co.
[6] This prayer is in use at the West Kensington Central School for Boys.

l'esprit que, dans ta grâce, tu nous as accordée. Nous te remercions des leçons qui nous élèvent et des connaissances que nous acquérons de jour en jour. Conduis-nous, O Dieu, dans tes voies, afin que la bonté de notre cœur grandisse en même temps que notre savoir. Purifie nos âmes, afin que nous n'ayons pas de pensées mauvaises. Éloigne le mensonge de nos lèvres et garde nos mains de faire le mal. Aide-nous, O Dieu, à obéir à tes lois et fortifie-nous contre la tentation. Aide-nous, O Dieu, à faire autour de nous notre devoir envers tous, afin que nous accomplissions ta volonté sur la terre et que nous recevions ta récompense divine.

Amen.

Even the beginners might be allowed to join in such services, though at first they will not understand them as well as the more advanced pupils. The need for rapid progress—especially in pronunciation and diction—will thus be made very apparent to them. It may be found best to ask one of the teachers of French to preside at such assemblies, especially if, in addition to the service, some announcements are made in French. The making of such announcements would be an excellent practice, as it would add special interest to the understanding of spoken French.

In schools where only a section of the pupils learn French, it might be possible to have a separate Assembly once a week for these pupils. Where even this is impracticable, French hymns and prayers might be given once a week in the classrooms of the pupils who take French, while the rest of the school meets in the hall.

### Entertainments

From time to time—at least, once a term—a "French afternoon" might be arranged. The usual time-table of all pupils learning French could be suspended for the whole, or part, of this afternoon, and the time could be devoted to an entertainment in French. Each class should contribute something. Even the beginners could produce a short song or round. As for the advanced pupils, in addition to recitations and songs, short plays or portions of plays could be given. And for the benefit of the younger pupils, each of these could be preceded by a résumé in English. A specially good performance could be ear-marked for repetition at the next school concert. This practice would probably cause a healthy rivalry among the various classes. But it should always be clearly understood that no piece, however well acted, could be selected for repetition unless the French pronunciation and diction were of a very high standard.

### Cercle français

In some schools it has been found possible to establish a *Cercle français*—an association of keen students of French who desire to do more than can be achieved within the ordinary limits of time. Although it usually needs an enthusiastic French teacher to keep such a club alive, the chief part of the work should fall upon the senior scholars. Debates

might be attempted on suitable topics, and with due notice. Individuals could be asked to give short addresses on subjects which interest them. A pupil who has read a particularly interesting book might be induced to give an account of it, a discussion following, if possible. Occasionally one of the French teachers might deliver a short lecture. And sometimes an outsider, possibly a French visitor, might be induced to make a contribution. This cercle might also have the ambition to produce a play of its own. Pupils from various classes in the school could thus be brought together in co-operation. A small annual subscription might enable the scholars to provide for general use some of the more " solid " magazines, such as *les Annales*, *l'Illustration*, and *Je Sais Tout*. The writer has known a cercle which produced a little magazine of its own—printed by means of the hectograph.[1] And he remembers that at times, when little else was doing, this same cercle was not above asking for the loan of the gramophone and some French records in order to supplement the classwork. But those were palmy days, when one of the pupils was so keen as to run the club almost entirely by himself.

## Lessons in French on Geography, Literature, &c.

The organization and staffing of some schools will permit occasional lessons in some of the ordinary subjects to be given in French to the older scholars. Where there are several teachers of French taking other subjects, there is no reason why attempts in this direction should not be made frequently. A geography lesson on *France and the French*, a history lesson on Napoleon, or a literature lesson comparing the works of Shakespeare and Molière (of course, in somewhat elementary fashion) would probably add interest to both the English and the French sides of the instruction. There is no need to worry over the fact that all the pupils do not follow precisely all that is said. If pictures and diagrams be freely used, if occasionally certain outstanding words be written on the blackboard, and if the teacher is careful to repeat himself frequently—using different language, where possible—the pupils will be able to seize the gist of what is said. It must be borne in mind that, even in the ordinary English lessons, the pupils do not always understand everything.

This practice of speaking entirely in French, even at the risk of the pupil's failure to understand everything, should be adopted from time to time in the ordinary French lessons to the senior scholars. In following the Direct Method, of course, the teacher uses French as much as possible. But he will never hesitate to " rap out " the corresponding English, when there is any danger of lack of precision in the meaning of the French. Occasionally, however, as we have suggested, it is good to banish all English. The teacher tells the scholars that he is going to proceed without a single word of English to the end of the lesson. He supposes himself to be a Frenchman, without any knowledge of English; and when he sees blank looks of failure to comprehend, he exerts himself by changes

[1] This magazine, among other features, contained cross-word puzzles in French.

in construction, by rough sketches and diagrams, by action and mimicry, and by any other means which he can devise, to make clear what he is saying to his scholars without the use of any English whatever. It will usually be found that the pupils become exceedingly keen on this exercise. They are delighted to find that they can really understand French.

### School Examinations

It goes almost without saying that our school examinations will be considerably modified with the Direct Method. Except in the case of senior pupils who are preparing for some external tests, there will be no translations. Thus such an " unseen " as the following might be given in a paper to Third Year pupils.

### Le maréchal Turenne et son domestique

Tout le monde sait cette anecdote qui, du reste, fait honneur à Turenne. Il se levait de fort bonne heure. Un matin qu'il prenait l'air à la fenêtre, un de ses gens, voyant un homme accoudé là en bonnet de coton, le prend pour son camarade et lui donne amicalement un énorme coup de poing. L'homme se retourne, et c'est Turenne. " Monseigneur," s'écrie le frappeur à genoux, " j'ai cru que c'était Georges."—" Mais quand c'eût été Georges," dit Turenne en se frottant, " il ne fallait pas frapper si fort!"

Instead of asking the pupils to translate this, the teacher will write:

Lisez ce morceau et répondez aux questions qui le suivent.

There may then follow some such questions as the following:

(1) De qui parle-t-on dans cette histoire?
(2) Qu'est-ce qu'un maréchal?
(3) Qu'est-ce qu'un domestique?
(4) A quelle heure le maréchal Turenne avait-il l'habitude de se lever?
(5) Pour qui son domestique le prenait-il?
(6) Qu'est-ce qu'il lui donna?
(7) Quelle excuse le domestique fit-il à son maître?
(And so on.)

As another part of the examination, a short tale could be read over two or three times, and the pupils could be asked to reproduce it. In this case, it would be advisable to write a few of the words read on the blackboard to give a *squelette.* Thus, if we suppose that the tale just given were selected for this purpose, instead of for questions upon it, the teacher could write: Le maréchal Turenne —— Il se levait —— il prenait l'air —— accoudé —— coup de poing —— Monseigneur —— à genoux —— j'ai cru —— Mais quand c'eût été Georges . . . Perhaps, instead of writing these words on the blackboard at the time of reading the story, the teacher could have them printed on the examination paper.

Supposing, once again, that the piece quoted had been printed for perusal and replying to questions, the teacher could also set a number of grammatical questions upon it. We could have, for instance, the following:

Mettez au présent de l'indicatif, au futur, au passé défini, et au passé indéfini: il se levait, il prenait, il ne fallait pas.

Au pluriel (partout): il lui donne un coup de poing.

Supposez qu'il y ait deux maréchaux et deux domestiques, et faites les changements nécessaires dans la phrase—Un matin . . . coup de poing.

Other grammatical questions can, of course, be set which are not on the extract quoted, the following being examples:

Mettez les verbes entre parenthèses au temps voulu:
(1) Il veut que nous (*partir*).
(2) Quelle erreur a-t-elle (*commettre*)?
(3) Je désirais qu'il (*partir*).
(4) Elle ne nous a pas (*obéir*).
(5) Ils se sont (*laver*).
(6) Ils se sont (*laver*) les mains.
(And so on.)

In general, we may say that the questions will be on the same lines as the exercises on the lessons of which we have already given examples.

The written paper should be supplemented by an oral examination, and this should carry at least as many marks as the written test. It should consist of three parts—dictation (a very important exercise in French), reading, and conversation. Some teachers have suggested that, if we have conversation, there is no need for reading, alleging that we can assess marks for pronunciation and diction during our talk with the pupil. But the object of the conversation test is to estimate the pupil's facility in understanding spoken French and in replying satisfactorily thereto. Further, and especially in the later stages, when a considerable range can be given to the conversation, the attention of both examiner and examinee is partially concerned with the ideas and with the forms of expressing them. Pronunciation, intonation, and accentuation will doubtless receive some attention; but they are likely to escape the closest scrutiny, especially when there is great facility. While the pupil is reading, however, full attention can be given to pronunciation and diction. This can be done all the more thoroughly if the teacher knows the piece to be read extremely well. It is, indeed, advisable, when very careful assessment is desired, that the piece selected should be one which is so familiar to the examiner that he can follow it without the book. If each pupil reads the same piece, it may be argued that the teacher will soon be in this position, as he proceeds with his examination. But this is not fair to all the pupils. For the first few to be examined may get off with less thorough scrutiny than the later ones. On the other hand, if the examination takes place in class,

the later ones have the advantage of hearing the piece read many times before their turns come. The best course is for the teacher to choose a piece which he already knows thoroughly well, to give each pupil a few minutes to look it through beforehand, and to hold the examination in a private room, into which only one pupil comes at a time. These conditions cannot, however, be obtained in all schools; and teachers have often to do the best they can in the circumstances.

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## CHAPTER XI

# Conclusion

Much more might be written on the details of method. In particular something might be said with regard to the keeping of note-books, the learning of verbs, and the acquirement of idioms, in which the French language is very rich indeed. But the methods of procedure in these matters will vary according to the books which are used, and according to the circumstances of each school. It is hoped that the general lines of attack have been indicated with sufficient clearness.

We may sum up the matter by saying that the guiding principle is: Present *the language itself* to the children from the first; call in the aid of English wherever the meaning of French can thereby be rendered more clear and precise; but beyond this, English should be banished, teacher and pupils using the new language to the utmost of their powers.

In contrast to this method, the writer is reminded of the way in which he was taught Latin. In particular, he remembers that his tutor used to give him for translation an idiomatic English rendering of Pliny's letters. *I have caught three boars, and stunners too*,[1] is an example of one of the sentences. After struggling to get a Latin rendering for such English, the pupils were finally given the original Latin. This is, once again, just the way *not* to do it. The original Latin should have been given first. It should have been studied and thoroughly understood. Then exercises in Latin should have been set upon it. And finally a similar piece of English, requiring much the same constructions, might have been given for translation into Latin. The painful groping about in a dictionary for words, and the stringing of these together in the hope of making constructions which will pass muster, is a futile task. One must become acquainted with the language before one can hope to speak or write in it. Fortunately for the scholars of the future, this is beginning to be understood, even in the sphere of the classical languages. And the reform which is taking place in the teaching of those languages, thanks largely

[1] *Apros tres, et quidem pulcherrimos cepi.*

to Dr. Rouse, the late Headmaster of the Perse School, Cambridge, is doing much to make the work really worth while.

But what of the teacher who cannot speak French, and who knows virtually nothing about phonetics? The writer is reminded of his early attempts to teach the subject in these circumstances. His knowledge of written French, as certified by examinations, was up to the standard we have prescribed. But, faced in a secondary school with boys of 15, working with *Macmillan's Second French Course*, a book on the old translation lines, he found it necessary to buy a Key to the exercises in order to mark the pupils' attempts. He realized that he had no " grip " of the language. And he might have gone on marking the exercises in this way for many years with little profit either to himself or to the boys. But he began to exchange conversation with a Frenchman, and to pay visits to France. He fell in with Dr. Baker, who was beginning the teaching of French by the aid of phonetics and the Direct Method. From that day, he never looked back. And now, over thirty years later, he is more than ever convinced that we must attack a language *in the mouth*, and by imitation of the language itself.

To those who are not prepared to do this, he has no message to give. The teacher must be interested in the living language. He must master its phonetics. And he must go on, day by day, living in its atmosphere as much as he can. He should not be satisfied merely to be just ahead of his pupils. He himself should be continually pressing forward to ever greater facility and comprehension. The spirit of progress is catching. If the teacher is really keen, the majority of his pupils will follow in his footsteps.

# ARITHMETIC

BY

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# ARITHMETIC

## CHAPTER I

## Some Preliminary Considerations

There is probably no subject in the whole school curriculum that tests so finely the teacher's capacity as does the teaching of arithmetic and elementary mathematics. There is certainly no subject in which it is easier for the teacher to make not merely mistakes but disastrous mistakes in teaching method, and yet be in ignorance of them. The teacher of mathematics who goes blindly on, unconscious of the error of his ways, may not only be failing to do anything of value so far as real mathematical education is concerned, but may even be doing a great deal of harm.

Let then the teacher who must teach arithmetic, or who from choice specializes therein, realize that he is undertaking the teaching of a subject which will test his powers to the utmost. Let him bear in mind that there is no master less respected than the bad mathematical master and no subject so disliked as badly taught mathematics. Let the teacher of arithmetic and elementary mathematics remember that from infancy—from the " this-pig-went-to-market " stage of counting units—his pupils have been interested in calculation and computation; that long before man invented for himself the simplest of methods for recording his thoughts he kept his tallies upon notched sticks and by the use of his fingers he made his simple calculations; and that even the dullest child has an instinct for figures and delights in calculating and computing. Let the young teacher remember that badly prepared lessons in arithmetic can be as ruinous to the pupil's almost natural appetite for numbers as a badly cooked meal can be ruinous to his appetite for food. Above all let the teacher realize that any evidence of a dislike for the subject on the part of the pupil or of a lack of self-confidence is a sure indication that something is wrong, not necessarily with the pupil. The teacher would do well to examine his methods.

Particularly important is it that the teacher should avoid falling into the error, too frequently made, of assuming that the main qualification for teaching either arithmetic or elementary mathematics is a knowledge of the subject. The mathematical genius is not necessarily the best teacher of

his subject, as not a few undergraduates know to their cost. Let, therefore, the non-mathematician who aspires to become an efficient teacher of arithmetic take courage. Provided that at the outset he recognizes that the subject is one which, as already stated, will test his teaching capacity to the utmost, and provided also that he is prepared to give to his task all the care and thoughtful preparation it demands, there is no reason at all why he should not become a successful teacher of his subject.

### The Teacher's Qualification

First and foremost the teacher must have a thorough understanding of child psychology, and ever keep in mind that he is concerned with the child first and arithmetic afterwards. He must guard against that most fatal of mistakes, viz. the dogmatic forcing of abstract rules which in the end leads to nothing more than the acquirement of knowledge by rote learning. In the teaching of geometry this danger is now fully realized. Euclid and learning by rote have been abandoned in favour of geometry and learning by experience. The teaching of algebra is still largely divorced from experience, whilst the tendency to rush children, even in the kindergarten, on to symbolic arithmetic, and the still more prevalent tendency to devote too much time in the junior school to written arithmetic to the exclusion of what is termed mental arithmetic, give evidence of the fact that the subject is being considered more important than the pupil. The teacher armed with a sound knowledge of the underlying principles of child psychology will plan his work and adapt his methods to suit the mental development of the child. He will recognize that the development of confidence and self-reliance which follows the thorough grasping of arithmetical truths gained by the pupil's own powers of observation and reasoning, initiative, and inventiveness, is of far more importance than mere mechanical skill in figure manipulation which may be obtained by the pupil's blind acceptance of abstract rules.

In the second place, the teacher of arithmetic should be acquainted with the history of his subject. As a student of psychology he will be prepared to give due attention to the fundamental principle that the individual recapitulates in his own development the essential phases through which the race has developed. This principle is readily accepted as being biologically true. Its application to educational theory is of the utmost importance in the teaching of arithmetic, particularly in the early stages. The task of deciding the length of time to be devoted to the various phases of development is undoubtedly a difficult one, but the fact remains that not only will the teacher of arithmetic find a knowledge of the history of the subject intensely interesting but extraordinarily stimulating to his own teaching methods. He will find that acquaintance with the history of the development of the subject provides him with a sound guide in planning his syllabuses, and will give him an unexpected insight into the difficulties which confront his pupils from time to time.

The teacher's own personality is a very important factor in the equipment

that goes to make the successful teacher of any subject in the curriculum. It is possible to argue that the degree to which a teacher's personality determines his success varies with different subjects. This is not the place to discuss such a question, but the writer is convinced that the personality of the teacher of arithmetic does play an enormous part in the success with which the subject is taught. It is necessarily so, for it is doubtful whether any boy will develop any real liking for the subject until he feels that he is becoming self-reliant. It is in this development of self-reliance and self-confidence and the encouragement of initiative that the personality of the teacher plays such an important part. The same set of boys who under one teacher will almost loathe the arithmetic lesson, will under another become keen and alert and will look forward with pleasurable anticipation to the daily lesson. To be a successful teacher of mathematics one must be not merely keen, alert, and enthusiastic, but must be, as it were, contagiously so. Added to this the teacher must possess ample patience and ever be ready to give sympathetic encouragement.

It follows from the foregoing that to be a successful teacher of arithmetic one must possess a genuine liking for the subject itself. It is not unusual to find successful mathematical masters who prefer teaching algebra and geometry rather than arithmetic, the result possibly of the vicious circle in which many otherwise successful teachers work. As a result of being taught the subject badly in their own school days they developed no enthusiasm for it, and, in their turn, having no enthusiasm for the subject, they teach it badly.

To such the writer would say—learn to appreciate that there is a vast difference between the dogmatic imparting of rote-knowledge and teaching for the purpose of developing, through experience and experiment, that sense of confidence and self-reliance which purposely has been strongly stressed above. It is the mechanical and abstract treatment of arithmetic which for many produces an utter distaste for it—a distaste which persists through life, and if the mathematical master finds he is cursed with this distaste he should make every effort to ensure that he is not responsible for the development of a like distaste in his pupil. Further, he should remember that, as a mathematical master, algebra is but generalized arithmetic, and to a very large extent, and particularly to the young pupil, geometry is applied arithmetic. It is therefore in his interest as a would-be successful teacher of mathematics that he develop a strong liking for his embryo subject.

## CHAPTER II

# Guiding Principles in the Teaching of Arithmetic

There are certain guiding principles in the teaching of arithmetic that every teacher should appreciate thoroughly. " What shall I teach?" and " How shall I teach it?" are questions which must be answered satisfactorily by every would-be successful teacher, whatever the subject. One way of settling such questions, so far as arithmetic is concerned, is of course by adopting a good textbook and " working through " it. Few teachers, however, who aspire to teach the subject satisfactorily will adopt blindly even some strongly recommended textbook without satisfying themselves as to the principles which should guide them in the work they are undertaking. " One of the distinguishing features of the work in the best European schools," says an eminent American professor of mathematics, " is the freedom with which the teacher omits matter from the textbook." Where this exercise of freedom is born of a desire to act, not blindly, but in accordance with accepted guiding principles, it is safe to assume that the teaching will be full of life and vigour.

What may be termed the three major guiding principles in the selection of material and method of presentation concern: (*a*) why we teach arithmetic; (*b*) what to include in the course of arithmetic we propose to teach; (*c*) when to teach what has been included in the course.

### The Routine, Scientific, and Creative Stages

The first principle to be laid down is that the study of arithmetic should be regarded, so far as ordinary school life is concerned, mainly as the acquirement of a technique, and that the study of underlying scientific principles is pursued chiefly for the purpose of perfecting this technique. We recognize this very readily in what are termed purely practical subjects. Our handicraft master concentrates primarily on the mastery of tools and materials, recognizing first of all the routine stage through which the pupil must necessarily pass. The teacher does not, at this stage, weary the boy with the scientific principles of the saw, the advantages of the saw over a knife, and so on. " Use it thus, and not thus," says the master, and the boy makes his first attempt to become proficient in the use of the tool and is absorbed in the routine of his task. Later, and how much later will depend upon the mental development of the boy, the master will direct the boy's attention to the mechanical principles of the saw—the wedge-shaped teeth and their peculiar setting—and he will talk to him about the end grain and the cross grain of the wood, and so on.

Armed now with knowledge of the scientific principles governing the use of the tool, the boy gains confidence in himself and perfects his use

of the instrument. This second stage in the development of his power over the tool, the logical, the scientific stage, arises out of the knowledge gained in the routine stage and perfects the technique. When he is entering the routine stage it will be demonstrated to him that pressing the saw into the wood, "jabbing" it or forcing it in any way, will make the implement impotent. The master demonstrates the firm but gentle stroke that is required. The dull, unintelligent, or even inattentive pupil may soon meet with disaster; at the best he fails to get the tool to work. He learns almost by experience and as he gains experience he improves his technique. The keen intelligent boy, however, meets no disaster. He carries out the instructions thoughtfully. He may even inquire "Why must it be done this way, why a firm gentle stroke?" and so on. In other words the boy enters the scientific stage almost simultaneously with his entry into the routine stage.

Carry the inquiry farther. We know that the first boy by virtue of superior manipulative skill and dexterity may outstrip the latter in the mastery of the technique, and there is every prospect that in time he will appreciate the advantage of knowing more and more of the scientific principles and the extent to which such knowledge aids him to a more complete mastery of his tools. In other words he is the type of boy who may develop into an intelligent, thoughtful, practical mechanic. The second boy, however, may become more and more absorbed in the scientific principles—he has exhausted his interest, it may be, in the routine stage—and he finally enters a third stage wherein, having at least satisfied himself that he can master the use of the tools, or having made the mastery thereof *automatic*, and having also grasped the scientific principles underlying the operation, he applies this scientific theory to creative work. He appreciates to the full what the tools can be *made* to do—he designs, he creates—he is now no mere mechanic but an engineer.

In the acquirement then of the mastery of any activity, we have these three stages: (1) the routine; (2) the scientific; and (3) the creative.

The above illustration has been set out at length because of the importance of the principle involved when applied to arithmetic. *It is most essential that the teacher should remember that in all mathematical work—and particularly in arithmetic—the pupil is acquiring mastery in a certain sphere of activity.* Each new arithmetical rule is to be regarded as a tool. There will be first of all the routine stage during which the boy is gaining, as it were, dexterity in the use of his new tool. Either at the time of his introduction to this new rule or soon after, or it may be even at a much later stage, he studies the scientific principles underlying the new rule, and this knowledge helps him to perfect the mastery of his new tool. And the deeper he penetrates into the third stage, the creative stage, the more he develops into the mathematician who may be termed the artistic or creative arithmetician.

It will be seen readily that the acceptance of this guiding principle will enable the teacher of arithmetic to determine what to teach and what to

omit in what is usually called arithmetic—a point which will, of course, be considered when we come to discuss syllabuses.

### Stages in the Development of the Individual

The second major principle to be recognized is one which in a sense follows from the first. It is that each individual passes through three well-marked phases in his development from childhood through adolescence to manhood, corresponding to the three stages mentioned above. *Childhood is essentially the period of full activity—the routine age; adolescence essentially the period of inquiry—the logical age; manhood the period of application—the creative age.*

The recognition of these three stages can best be emphasized by the recital of certain well-known facts. We all remember, for instance, how much more readily we were able to learn by heart during our childhood than later in life, and every experienced teacher of arithmetic will agree that the pupil who has not been thoroughly drilled in " tables " prior to the age of twelve is for ever after handicapped so far as accuracy of working is concerned. It is during childhood that mental energy is directed chiefly to routine work. Again, our own experience teaches us that during the age of adolescence there is a steady decline in accuracy; the mind seems to be losing its interest in the skill acquired during the routine period. What is really happening is that the pupil is passing out of the period of sense impression, with consequent lessening of his interest in the world without, into the period of feeling and emotion with consequent increase in his interest of the world from within.

It is the common experience of every secondary school mathematical master that whereas boys of thirteen upwards are ready to take a keen interest in algebra and geometry, their interest in arithmetic steadily declines. It is true that this may be due in part to bad teaching during childhood, for there can be no doubt " that the mechanical abstract treatment of arithmetic which has been so common in the past has produced for many a distaste for the subject which has persisted throughout life ".[1] But this does not account for the fact that many pupils who up to the period of early adolescence have shown a keen interest in arithmetic almost suddenly develop a dislike for the subject—or at least take but a placid interest in it whilst at the same time developing a keen interest in well-taught algebra and geometry. The phenomenon can only be explained by the fact that the pupil has left the routine age and entered the rationalizing, systematizing age, and that more interest is being found in the logical and scientific development of the subject to the subordination of the interest in mere mechanical work.

Acceptance of the first of the major guiding principles here set forth will help the teacher to determine what to include and what to omit in his syllabus. The acceptance of this second guiding principle will further assist him in the same task by emphasizing that there is a period for maximum

[1] Hadow Report, *The Education of the Adolescent.*

attention to routine work and a period when more generalized arithmetic and the underlying principles of the subject will make the greater appeal.

### Why we teach Arithmetic

The third guiding principle is this: *The teacher of arithmetic as a teacher of mathematics should ever be mindful of the fact that his task is mathematical education—not the education of mathematicians.* In other words the task is, as has already been said, not so much to teach arithmetic as to teach boys. The recognition of this guiding principle will enable the teacher to appreciate the fact that arithmetic is included in the curriculum partly because of its usefulness in daily life.

" It is desirable that much of the traditionary arithmetic of the schools should be replaced by new material, especially such as is necessary for the intelligent comprehension of some of the problems of our everyday life." [1]

At the same time arithmetic is included for what is termed cultural reasons —because of the training it gives to the mind in reasoning and logical thinking; in habits of application and accuracy; in exactness and conciseness of statement. " The assertion that a statement is ' mathematically exact ' is not without meaning, and the habit acquired under some helpful, sympathetic, inspiring teacher, of setting forth the work in arithmetic neatly, clearly, and with no superfluous labours is one of those mental acquisitions that may easily ' carry over ' into the ordinary work of practical life." [2]

Without entering into a discussion of the claims of arithmetic and elementary mathematics to be considered as either cultural or utilitarian, the teacher of arithmetic should take it that the subject is included in the curriculum both for the mental discipline it imparts and because of its usefulness. There is hardly any subject of study which has not educational, and therefore cultural, value, so long as it is treated educationally. *Let it therefore be recognized at the outset that arithmetic is taught because of its usefulness*, and that its value from the point of mental discipline and the training that it gives the mind in reasoning processes, the habits of application it inculcates and the training it gives in clearness and conciseness of expression, depend on how the subject is taught. Do not let the boy think he is being taught arithmetic because it is considered to be good for him. This is the surest way of getting the average boy to dislike the subject. Let the boy feel that he is working with a subject that is useful to him. It is quite true, of course that " arithmetic has been too long dominated by the traditional utilitarian value of the subject ". But as the same authority points out almost immediately—" Our modern industrial system with its complex ramifications and the part played by science in the modern civilized community make greater demands upon the mathematical knowledge of the ordinary citizen." In other words to keep in mind that we teach the subject because of its usefulness in modern life is not to emphasize its utilitarian nature, but rather

[1] The Hadow Report, *Suggestions on Teaching Elementary Mathematics.*
[2] Professor David Eugene Smith.

to give due regard to the dual purpose for including it in the school curriculum. Let us then quite unashamedly teach the subject, and let the boy feel he is learning the subject, because of its usefulness; but at the same time let us keep in mind that its value from a cultural point of view depends upon what we include as being useful and the manner in which we present it.

### The Place of Mental Arithmetic

From the earliest the pupils should be encouraged to " think arithmetically ". For this reason written work should not be introduced too soon in the junior or infant school, and the bad old practice of regarding mental arithmetic as a subject distinct from arithmetic should never be adopted. So-called mental arithmetic should be regarded to a very large extent as bearing the same relationship to arithmetic as oral composition bears to language teaching, and it might very well be called oral arithmetic. See p. 216.

### The Syllabus

What was said above regarding arithmetic as a useful subject should be the guiding principle in drawing up syllabuses at all stages. In the early stages the syllabus should be modelled on the principle of what will be wanted for later stages; and the syllabus for the later stages should be modelled on the two-fold principle of (*a*) making the subject useful from the point of view of citizenship, and (*b*) making the subject form a basis for other branches of mathematics and mathematical science.

Not only should such subjects as complicated fractions, recurring decimals, cube roots, and complicated work in practice, in H.C.F. and L.C.M., be entirely omitted from the syllabus, but throughout the course all purely artificial problems, such as are frequently found in compound proportion exercises, should be excluded. Even such problems as inverse simple interest, as finding the time taken for a sum of money to earn a given interest at a given rate per cent, though such may serve the purpose of emphasizing the fundamental work already done in the examples on simple interest itself, should not be regarded as seriously important.

This vigorous elimination of non-essentials from the arithmetic is not to be interpreted as an attempt to reduce the amount of time to be devoted to the subject. Rather it is a question of the change of emphasis, giving more time and practice to the really essential work. " When we consider the necessary work in arithmetic," says Professor David Eugene Smith, " we are struck by its simplicity and brevity. When we think that this is all that the world usually demands of the school and that we are allowed eight years in which to impart this knowledge, we are led to ask ourselves why the world is not satisfied with the results. Is the difficulty with ourselves in that we include a lot of matter of relatively little value, but which consumes the time without any just return? Or do we fail to insist on the fundamentals while we are teaching the more advanced topics that find place in our schools?"

Whether the world is or is not dissatisfied with the results attained after eight years' teaching, experienced teachers know that the inclusion of matter of relatively little value is not only unsatisfying to the pupils but destructive of their interest in the subject. At the same time the neglect of fundamentals tends to destroy pupils' self-confidence.

*The guiding principle in drawing up the syllabus, therefore, should be: give the fundamentals proper emphasis and rigorously exclude the relatively unimportant.*

## Teaching Method

Inasmuch as the development of initiative and self-reliance is one of the most important aims in mathematical education, the teacher should endeavour always to play the part of a sympathetic guide. Dogmatic teaching of the " do-it-this-way " type will lead to unintelligent and unresponsive imitation. At the same time extreme " Daltonian " methods may tend to destroy self-confidence. A judicious blending of intelligent imitation and independence of effort, resulting from happy co-operation between the pupil and the teacher, will ensure that interest is maintained, but not at the expense of the development of self-reliance.

The application of this principle of co-operation between teacher and taught implies (*a*) that arithmetical facts should be gained by direct appeal to the senses, that is, through concrete experience, and (*b*) that before any new rule is introduced the pupil should feel the necessity for it rather than have it imposed upon him. Every experienced teacher knows that you cannot force a child to co-operate. The teacher must secure natural and willing response from the pupil, and he can only do so by appealing to sense experience, and by developing a consciousness of the necessity for, or advantage of, undertaking the work. To take an example; the first lesson on, say, long division should develop naturally out of an appreciation on the part of the pupils of the necessity for some method of dealing with computations that cannot be solved by the short division with which they are already familiar. If the necessity is properly appreciated the teacher may even find it advisable there and then to say: " Well look, this is how we do it, watch carefully!" He then proceeds to work the sum without a word of explanation, the pupils watching eagerly, if they are really alive to the *necessity* for something other than short division. " There's the answer—let's prove whether it's right," and the product of answer and divisor proves the correctness of the method. " Let us do another one," says the teacher. The machinery is started once more, the handle, as it were, is turned, and again the answer comes out at the other end and is proved correct. " Here's an easy one," at length says the teacher; " see if you can discover how I do it. Watch carefully as I go slowly." They are told that this is an invention thousands of years old and are asked to find out how it works. And having found out how it works, they proceed to use their new-found tool. In due course they will go into the question of why it works. This is what is meant by a judicious blending of intelligent imitation and independence of effort—

of natural response awakened by a sense of necessity for something more than is already known.

*Too often we confuse the minds of our pupils by forcing upon their attention arithmetical rules and explanations before they appreciate the need for the one or have any interest in the other. If co-operation is to be the keynote of the teacher's method in arithmetic, it must come from willing response and not from conscripted mental forces.*

### Marking and Correction

The interval between the execution of the work by the pupil and its subsequent marking and correction must be as short as possible. It goes without saying that no work must go unmarked and no work must go uncorrected. The correction by the pupil of work that is wrong must always be insisted on. The young teacher must never make the mistake that *his* work on the blackboard is more important than the pupil's in the exercise book. It must become a habit to mark all work promptly and thoroughly and to insist upon " corrections ".

This is not to say that the teacher himself must do all the marking. Tests must, of course, be marked by the teacher, at least in all but the more advanced forms. The pupils should be trusted to mark their own work. The few who cannot be trusted will soon be discovered if tests are carefully marked, and they will soon learn that dishonesty does not even pay. Further, unless the pupils are trusted to mark their own exercises, it will be impossible to allow pupils to make their own pace.

Pupils, of course, should be encouraged to check all their working, and wherever possible to " rough check " answers, proving their correctness. Here again if corrections are insisted upon pupils will soon form the habit of checking all their own work. Nothing contributes more to development of self-reliance than the feeling that what has been done is certainly correct.

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CHAPTER III

# Mental or Natural Arithmetic

Reference has already been made to the importance of what is usually termed mental arithmetic, a part of arithmetical education which is either almost wholly neglected or is put in its wrong place.

It is by no means an uncommon experience to find whole forms doing neat careful work in arithmetic and yet displaying nothing but timidity and hesitation when dealing with mental problems suitable to the age. The prevalence of the use of " scrap paper " and the large amount of figuring which fills the margins on so many arithmetic papers give ample evidence

of many a pupil's lack of self-confidence in the matter of arithmetical calculations which should be done mentally and quite naturally.

Now, why is it that the majority of teachers either neglect this aspect of arithmetic altogether or assign to it a comparatively unimportant part in the normal lesson, using it either as a stepping-stone to more difficult examples which will require written work or utilizing it for a purpose of mental gymnastics? The reason is not far to seek. In this as in other phases of school organization we are working in a vicious circle. The teacher of to-day was " brought up " to regard written arithmetic as the more important and as such he presents it to his pupils. The skilful teacher, getting nearer the true function of mental arithmetic, devotes the first portion of a lesson to easy examples which will make clearer the new process he is about to teach. In both cases, however, mental arithmetic is regarded as useful merely so far as it is an aid to written arithmetic.

Now neither of these practices is to be despised. Each serves a useful purpose but neither recognizes the real function of either mental or written arithmetic. To devote a portion of each lesson to such so-called mental arithmetic is mentally stimulating, and serves the very admirable purpose of making the pupils keen and alert and of helping to perfect their knowledge of, and to facilitate their use of, the arithmetical facts known to them. It is a form of mental drill which undoubtedly serves a most useful purpose. But treated as an end in itself or as something more or less distinct from written arithmetic its true function is being misunderstood.

Again, when it is used as a means for preparing the way for the introduction of a new rule, this so-called mental arithmetic without doubt fulfils a very important function. It ensures that the pupil is concentrating all his attention on the real work in hand, suffering no distraction on account either of difficult computations, or of even the use of pen and paper. Problems are deliberately chosen which involve the minimum amount of " working " in order that the process itself shall not be confused. Paradoxical as it may seem, it is in this latter use of so-called mental arithmetic that we are getting nearer to its real function, even though the amount of purely arithmetical working involved is considerably less than in examples given as mental drill.

## Real Function of Mental Arithmetic

What then is the real function of mental arithmetic, and what relationship does it bear to the subject as a whole? The only answer that can be given is that the function of mental arithmetic is the function of arithmetic itself. *The distinction should not be between mental arithmetic and arithmetic, but between arithmetic and written or mechanical arithmetic.* What we call mental arithmetic is not merely the handmaid of real arithmetic but *is* real arithmetic. Primarily written arithmetic is the handmaid, that is to say, it comes in to assist the mind to carry out more expeditiously the particular problem under consideration. This is so historically. In the course of evolution man eventually reached a stage in his ability to compute when

a mechanical aid became a necessity, and so we find, throughout the ancient and modern world, machinery invented for this purpose—some form or other of the abacus that we still use very largely in our kindergarten to-day. This was the first form of written or mechanical arithmetic. After this somewhat complicated and clumsy machine had been in use probably for thousands of years, we find that a symbolic representation of numbers was evolved. Later came the invention of place values for the figures, giving what has been termed a " graphical abacus ".

Thus, fundamentally all written arithmetic is only some form of mechanical aid to the real arithmetic, which is usually termed mental arithmetic. This is a fact of the first importance to the teacher of arithmetic from the kindergarten stage upwards. Not until we have so-called mental arithmetic adequately recognized as real arithmetic shall we have the subject properly taught.

### Mental Multiplication

There is here room for bold experiment, particularly in the junior school taking pupils up to the age of eleven years. Are we sure that we do not underestimate the ability of the average pupil in mental computation, supplying to him the mechanical aids which written arithmetic offers before such are really needed? For example, if a boy of eight or nine years of age, of average intelligence, who has been taught no written arithmetic, but *who has really been taught to think in numbers as distinct from figures*, is asked the product of say $17 \times 8$, he will, if 17 to his mind suggests not merely a one and a seven, but ten and seven, quite naturally say 8 tens are 80, 8 sevens are 56, total 136. We do not unfortunately give our pupils of eight or nine a chance to develop this natural method of mental multiplication. Instead we take it for granted that they can only multiply $17 \times 8$ with the aid of pen and paper and carefully ruled lines. We even penalize the pupil who, using his native intelligence and refusing such props, writes down the answer. We refuse to accept his answer because he has not *shown* how he obtained it.

Now if a pupil of this age is capable of multiplying $17 \times 8$ by registering mentally first the number 80 and then 56 and then 136, is it not evident that in showing him how to do it on paper we are introducing him to written arithmetic before it is absolutely necessary? And are we quite sure that with practice our pupils could not mentally multiply $17 \times 18$? Most boys of twelve upwards, and for that matter most adults, would find it difficult to do so. And in our attempt what should we be doing? We should visualize the figures 17 and 18 placed under one another, that is we proceed to visualize the whole of the paper work. In other words we are not working mentally but we are visualizing the whole mechanical process. Had we been taught from our infancy to think in the language of numbers and not in symbols, we should have obtained the product by mentally registering the numbers 170 (i.e. $10 \times 17$), then 250 (i.e. $170 + 8 \times 10$), and finally 306 (i.e. $250 + 8 \times 7$).

As already mentioned, there is room here for bold experiment in the junior school. We do not know how far this natural mental method of multiplication is capable of development. We introduce our pupils far too early to the written mechanical methods, and the writer is inclined to think that we tend thereby to arrest the development of the mental processes.

We have, of course, the classic example of Bidder, the famous engineer, who, in his presidential address to the Institute of Civil Engineers in 1856, explained at length how it was that he was able amongst other feats of mental computation to give almost instantaneously the product of three-figure numbers. " You begin at the left hand extremity and conclude at the unit, allowing one fact to be impressed on the mind at a time. Thus in multiplying 373 by 279, I know almost at once that the product is 104,067," and he went on to show that by mentally registering first 60,000 (200 × 300), then obliterating this in favour of 74,000 (60,000 + 200 × 70) and so on, he rapidly arrived at the final product. *His arithmetic was nearly all self-taught.* " My first and only instructor was my elder brother, a working mason, who after teaching me to count to ten urged me to go to a hundred, and there he stopped. . . ." He became perfectly familiar, however, with numbers up to 100. " They became my friends and I knew all their relations and acquaintances," so much so that without knowing one figure or symbol or the word " multiply ", he taught himself all his tables up to 10 times 10 with the use of marbles. Bidder so developed his power of mental registration of numbers that he could even multiply twelve places of figures by twelve places, mentally.

He declares significantly: " *The reason for my obtaining the peculiar power of dealing with numbers may be attributed to the fact that I understood the value of numbers before I knew the symbolical figures. I learnt to calculate long before I could distinguish one figure from another.*" Bidder's gift is, of course, exceptional, but there are three important points worth noticing regarding his remarkable ability in mental computation, viz. (1) his arithmetic was self-taught and therefore the written mechanical processes were a closed book to him; (2) he learnt number values before symbolical figures; and (3) he developed to a remarkable degree the natural power of number registration and he maintained that the utility of mental processes only ceases when such mental registration becomes slower than registration on paper.

Do we then, in our junior schools, give sufficient attention to the development of this power of mental number registration? Does not the tendency to depend upon scrap paper, to fill margins with small sums in subtraction, addition, multiplication, and division, to work small " side " sums, to shirk addition and subtraction of figures arranged in horizontal lines as compared with the column arrangement and the frequency of mistakes in simple calculations, all tend to show that there is lacking in our work the self-confidence that mental proficiency alone can give?

The writer does not suggest that boys of twelve should be able to work multiplication sums of three figures by three figures mentally. He does

not underestimate the value, at the right time, of written arithmetic and the importance of logically arranged written explanations. He does suggest, however, that the mechanical aids to mental processes should not be given until the pupil feels the need for them and can therefore fully appreciate their value.

Incidentally it is worth noticing that when the mathematical master comes to teach multiplication in algebra he insists on his pupils being able to *write down* the product of $(2x + 7)(3x + 5) = 6x^2 + 31x + 35$ and with practice the ability to do so is soon acquired. Who will say that the boy who can do this cannot mentally register multiplying 27 by 35, i.e. $(2 \times 10 + 7)(3 \times 10 + 5)$ with comparative ease? Bidder himself pointed out that his mental calculations were the same processes as used in algebra, but " fortunately for me ", he says, " I began by dealing with natural instead of artificial algebra ".

## Mental Addition

The mental working of fairly simple multiplication has been dealt with at length because it illustrates more clearly the advantage of developing the habit of thinking in numbers and not in figures, but the same applies to other arithmetical rules. For instance in adding numbers together every encouragement should be given to carrying out the process in the natural way of dealing in numbers. Thus, the stage having been reached when the pupil is able to add a series of numbers together, say $6 + 3 + 8 + 5$. the mental process should be 6, 9, 17, 22, *not* 6 and 3 are 9, 9 and 8 are 17, 17 and 5 are 22.

Then later in the addition of, say, 25, 47, and 62, the process should be 25 and 40 gives 65 and 7 gives 72 and 60 gives 132 and 2 gives 134. The actual numbers registered in the mind are 25, 65, 72, 132, 134, and with practice the intermediate numbers are omitted and the mind registers only 25, 72, and 134. *The important point is that the pupil all the time is thinking in numbers and not merely manipulating figures and symbols.*

## Mental Subtraction

The same natural process should be encouraged in subtraction, and all the nonsense relating to " borrowing and paying back " abolished. Thus, the pupil who is called upon to subtract 37 from 185 will give the answer immediately as 148, arriving at it naturally by mentally registering first the number 155 (the difference between 185 and 30) and then 148 (subtracting the other 7). Or, to take a more difficult example, subtract 368 from 527. The numbers registered mentally are 227, 167, and 159. The pupil of course will be encouraged to check his answer by going through the reverse process of addition, registering the numbers 159, 459, 519, and 527.

In all such processes there is something mentally satisfying and invigorating. The pupil feels he is grappling with the problem as a whole and is depending upon his own natural ability. As the process continues so

he gains confidence in himself, and this in its turn stimulates him to proceed to the next step. This stimulation in its turn impels concentration and the work proceeds more accurately. There are no rules to remember, no " carrying " and such like. Compare all this with the totally different, largely unintelligible, and altogether unsatisfying piecemeal method of " 8 from 7 I cannot, borrow ten—8 from 17 leaves 9 ".

### Mental Division

Division, of course, is itself an entirely mechanical means of doing repeated subtraction, not a natural process at all. Thus in dividing 568 by 32, the pupil is really being taught a shorthand method of finding how many times 32 can be taken from 568, in other words, how many times the number 32 is contained in 568. Even so the pupil who has been encouraged to adopt natural and therefore mental methods in the other rules until such time as mental limitations require other and mechanical means, will secure a more intelligent grasp of this purely mechanical method of doing division. In the example given, for instance, he will have very little difficulty in appreciating that the first figure he obtains in the dividend is not 1 but the number 10, and that the complete answer will be between 10 and 20.

### Conclusion

To prevent misunderstanding it should here be noted that, in all that has been said above, *abstract* numbers have been considered because it is the subject of computation and the relation of this subject to real mental arithmetic that is under discussion. In other words, only that stage in the solution of the concrete problem has been considered in which the computation of the actual numbers involved is for the moment the work in hand. The plea here put forward is for an appreciation of the right place of so-called mental arithmetic in the teaching of the subject as a whole, and in particular for more reliance on purely mental processes, acting through the subconscious mind, than on the more mechanical processes of written arithmetic. It must also be pointed out that the extent to which such natural mental processes should be encouraged to the exclusion of the artificial mechanical processes depends upon the mental ability of the pupils. A boy of average intelligence should not find it necessary to break off in the course of a problem to work a five-line sum to find the product of 28 and 37. It should not be necessary for such a boy to perform a long addition sum in order to find the total amount of such sums as £1, 3s. 6d.; 5s. 9d.; £2, 3s. 8d.; and £1, 6s. 5d. His mind is quite capable of registering in turn the amounts £1, 6s. 5d.; £3, 10s. 1d.; £3, 15s. 10d.; and finally £4, 19s. 4d. It is only a question of developing the habit of mentally registering numbers or quantities, relying upon self rather than upon the mechanical manipulation of figures. More should be done to encourage this habit of " thinking quantitatively " from the earliest years upwards. At present our capacity to do so is much underestimated, with the result

that the majority of us go through life with an extraordinary want of confidence in ourselves in dealing with numbers and quantities.

To sum up then, so-called mental arithmetic is natural arithmetic, and therefore arithmetic proper. Written arithmetic is largely mechanical arithmetic—the arithmetic which gives to the mind the mechanical aid which it requires in order not to put undue strain upon mental energy. Mental arithmetic is here termed natural arithmetic, to distinguish it from symbolic or artificial arithmetic. It involves treatment of numbers rather than the manipulation of figures. On historical grounds it should come first. Written work should be delayed as long as possible, and when introduced should be largely for the purpose of recording the results of mental computation. On physiological and cultural grounds, too, this mental or natural arithmetic should precede written arithmetic, and should form the bulk of the work in the early stages of school life, for not only does it ensure a more effective storage of arithmetical facts to be used later, but it develops precision, accuracy, and above all self-reliance. Inaccuracy in arithmetic arises mainly from misapplied mechanical processes or inaccurate manipulation of figures. The more time is devoted to this natural arithmetic, the more familiar will the individual become with the fundamental facts, and the more accurate will computation become. It will be remembered that mention was made earlier regarding the decline in accuracy as the individual approaches and enters the adolescent period, and the surest way of combating this tendency is to make the mental arithmetical processes become more and more automatic.

Finally, on mathematical grounds, too, this natural arithmetic has the priority of claim. The more natural our arithmetical methods are, the more natural will be the transfer from arithmetic to algebra, i.e. to generalized arithmetic and to other branches of mathematics. The more we encourage our pupils to think numerically and quantitatively, the easier it will be for them to think mathematically. If we are to succeed in "developing in the pupils an appreciation of the meaning and teaching of a coherent system of mathematical ideas, and the realization of the subject as an instrument of scientific, industrial and social progress",[1] we must, in the early years, regard the teaching of arithmetic as the first step in mathematical education, and get away from the mere manipulation of figures.

[1] Hadow Report, *Suggestions on Teaching*.

# CHAPTER IV

# Written or Symbolic Arithmetic

Consideration of written arithmetic is necessarily complementary to the preceding discussion on mental arithmetic. Historically the invention of symbols followed the purely mechanical aids such as the abacus. The assistance which such an invention rendered to man's intellect in the matter of computation ultimately led to the science of numbers which the Greeks called *arithmetic*, as distinct from their *logistic*, which was concerned entirely with numerical calculations: the fundamental four rules and their application to trade and commerce. The arithmetic of the Greeks was distinctly philosophic; it dealt with the science of numbers, which in time developed into the study of generalized arithmetic which we call algebra.

It should frankly be recognized that in our schools we are only to a very small extent concerned with the science of numbers, and that, for the most part, it is not until we enter upon the study of algebra that we are dealing with the subject from a purely scientific point of view. We are mainly concerned in teaching our pupils the use of the tools. Our written or symbolic arithmetic is a mechanical instrument invented for the purpose of assisting the mind to carry through mental computations more expeditiously and with an economy of effort.

## Function of Written Arithmetic

It will thus be seen that what has been said previously regarding the importance of mental arithmetic is not intended to convey the idea that written arithmetic is relatively unimportant. On the contrary, the importance of mental arithmetic has been stressed in order that, the true relationship to written arithmetic being established, the important function of the latter will be the better appreciated. The more the true value of mental or natural arithmetic is appreciated, the easier will it be understood that the function of written and symbolic arithmetic is to enable computation to be carried out more expeditiously and without undue mental strain. It has been urged that pupils of a fair intelligence can add a series of two-figure numbers together by mentally registering first, the sum of the first two numbers, then the sum of that total with the third, and so on. It is further claimed that this is the natural process, that to do so causes no undue mental strain, and that with practice the method can be carried out quite as expeditiously and accurately as first adding all the unit figures and then the tens figures. The mental registration of three-figure numbers is, of course, more difficult, and hence we reach the stage, for some at least, when mechanical help is required. It may be contended, of course, that if ultimately the pupil has to adopt purely mechanical methods, he may as well get accustomed to them

from the first. But apart from the question of the importance of encouraging young pupils in the habit of thinking in numbers and not in figures, do we not find, as the result of the over-emphasis placed upon written arithmetic, that there is a tendency to fill margins with unnecessary figuring or to depend largely on the use of scrap paper? Do we not also find that even with intelligent pupils the dependence on paper work is so habitual that not only is work done in the margins, which might well be done mentally, but the longer mechanical processes are used to a ridiculous extent, even to dividing by 200, say, by long division? Do we not also find that pupils who have been encouraged to do all their arithmetic on paper, and discouraged even if they attempt to rely on mental process, find it extremely difficult to obtain an approximate answer to problems or " rough check " the answers obtained? Pupils to whom mental arithmetic is as familiar as written arithmetic will almost instinctively work out approximate answers before they attempt the written work, whilst their keen appetite for mental calculation tempts them to " rough check " not merely answers, but all their working. Intellectual sluggishness results from the deadly slow methods associated with excessive written work. It is a fair inference to make that pupils who produce such working have none of that self-confidence in their mental processes which it is the special function of the teaching of arithmetic to inculcate.

In the written arithmetic of the normal school life the pupil, then, uses those mechanical processes which have been devised to assist the mind in the solution of more difficult and more complicated problems. As the problems become more and more difficult, so the mechanical processes pass from the simple hand-tool variety, as it were, as in the fundamental rules, to those of a fairly complicated machine variety, as in the simplification of fractions and the use of logarithms. The teacher's problem is to assist his pupils to become proficient in the use of these tools and this machinery. Do not let it be thought that learning to use a machine necessarily produces a mere machine-like mind. Any novice can start, steer, and stop a car, but only the intelligent and thoughtful application of this knowledge will produce the expert driver. And the more intelligent and thoughtful the application, the more the scientific principles underlying the processes will be understood, and may even be extended.

**Combination of Mental and Written Work.**—In order to carry out his function of assisting his pupils to become proficient in the use of arithmetical tools and machinery the teacher must, with the eye of an expert, select the tools most suitable for the young craftsman and also the machinery which will prove the most efficient under the control of the young mechanic. Let us examine three types of machine performing the same work, that is to say, let us examine three arithmetical methods of solving the same problems.

*Problem:* Find the cost of excavating a V-shaped trench 120 yd. long at 2s. 6d. per cubic yard, given that the width of the top of the trench is 3 ft. 6 in. and the depth 2 ft. 4 in.

### Method 1

Cross section of trench is a triangle:

$$\frac{3'\,6'' \times 2'\,4''}{2} = \frac{42 \times \overset{14}{\cancel{28}}}{\cancel{2}}$$

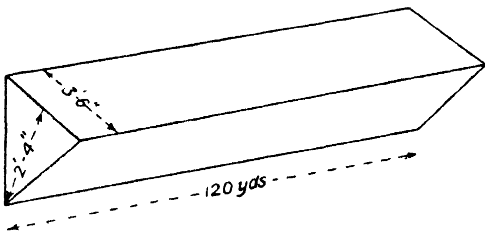
$$\begin{array}{r} 42 \\ 14 \\ \hline 168 \\ 42 \\ \hline 588 \\ \hline \end{array}$$

$$588 \text{ sq. in.} = \frac{\overset{49}{\cancel{\overset{196}{\cancel{588}}}}}{\underset{36}{\cancel{144}} \times \underset{3}{\cancel{9}}} \text{ sq. yd.} = \frac{49}{108} \text{ sq. yd.}$$

$$\text{Volume of trench} = \frac{49}{\underset{9}{\cancel{108}}} \times \overset{10}{\cancel{120}} = \frac{490}{9} = 54\tfrac{4}{9} \text{ cu. yd.}$$

$$\begin{aligned} \text{Cost of excavation} &= 54\tfrac{4}{9} \times 2\text{s. } 6\text{d.} \\ &= \frac{\overset{245}{\cancel{490}}}{9} \times \frac{5}{\cancel{2}} \text{ shillings} = \frac{1225}{9} \text{ shillings} \\ &= 136\tfrac{1}{9} \text{ shillings} = £6,\ 16\text{s. } 1\tfrac{1}{3}\text{d.} \quad \text{Answer.} \end{aligned}$$

### Method 2




$$\begin{aligned} \text{Area of cross section} &= \tfrac{1}{2}(3\tfrac{1}{2} \times 2\tfrac{1}{3}) \text{ sq. ft.} \\ &= \frac{1 \times 7 \times 7}{2 \times 2 \times 3 \times 9} \text{ sq. yd.} \end{aligned}$$

$$\begin{aligned} \text{Volume} &= \left(\frac{49}{\underset{9}{\cancel{108}}} \times \overset{10}{\cancel{120}}\right) \text{ cu. yd.} \\ &= \frac{490}{9} \text{ cu. yd.} \end{aligned}$$

$$\begin{aligned} \text{Cost of excavation} &= £\frac{\overset{245}{\cancel{490}}}{9} \times \frac{1}{\underset{4}{\cancel{8}}} \\ &= £\frac{245}{36} \\ &= £6\tfrac{29}{36} \\ &= £6,\ 16\text{s. } 0\text{d. approx.} \quad \text{Answer.} \end{aligned}$$

**Method 3**

$$\text{Cost} = £\tfrac{1}{2}(3\tfrac{1}{2} \times 2\tfrac{1}{3}) \times \tfrac{1}{9} \times 120 \times \tfrac{1}{8}$$

$$= £\frac{1 \times 7 \times 7 \times 1 \times \overset{\overset{5}{\cancel{10}}}{\cancel{120}}}{\cancel{2} \times \cancel{2} \times \cancel{3} \times 9 \times \underset{4}{\cancel{8}}}$$

$$= £\frac{245}{36}$$

$$= £6{\cdot}8$$

$$= £6,\ 16\text{s. } 0\text{d.}$$

The first method is typical of that adopted by the pupil who is too dependent upon paper work. In other words, it illustrates the results of written work being done to the exclusion of mental work, instead of aiding such work. It is an example of clumsy arithmetical method, showing a lack of precision, and involving a considerable waste of effort. It is neither business-like nor logical. Without attempting to criticize details which illustrate bad practices, such as unnecessary marginal figuring and the useless degree of accuracy in the final answer, it may be said that the chief fault of the method is that the written work is not fulfilling its purpose of merely assisting the mental process, but is acting as a substitute for practically all the mental work which the problem involves. To that extent it illustrates just what written work should not be.

The second method illustrates at almost every step that the written work is there to assist the natural or mental arithmetic. First the diagram serves the purpose of helping to concentrate on the problem as a whole. Such simple diagrammatic representation helps to make the problem more concrete, and encourages the pupil to consider the problem first as a whole, in order later to analyse it into its components. This analysis is clearly indicated. The cost will be the cost per cubic yard multiplied by the number of cubic yards in the volume excavated. The latter is then analysed into area of cross section multiplied by length. Mentally, then, the whole problem has been broken down into its several parts and now committed to paper to assist the mental arithmetic, (1) area of cross section, (2) volume, (3) cost. At each of these steps almost all the work is done mentally and there is no wastage of energy. All through, the written working is fulfilling its function of *assisting* the mental processes. The arithmetic is not figure manipulation, it is natural mental arithmetic aided by the machinery of written symbols.

The third method is what might be termed the practical business man's method, the work of the more expert craftsman. Here it will be noted that the mechanical paper work is reduced to a minimum. The problem as a whole is held in the mind without the aid of a diagram, and with the maximum of self-reliance the figures are, as it were, placed in at one end of the machine and the answer comes out at the other.

The second and third methods, then, both illustrate the real function of written arithmetic, and the question now is—which of these two methods is the teacher to encourage. The second method differs only from the third in so far as after the pupil has grasped the problem as a whole, the various steps in the solution of the problem are set out clearly and separately. The third method omits these statements and, proceeding direct to the necessary working, obtains the answer more expeditiously. Whilst, however, rapidity of working is, of course, much to be encouraged, particularly as it involves and therefore develops the habit of concentration of thought, it must never be gained at the expense of reasoning. The business man is concerned only to get his answer as quickly as possible, and he goes straight for it without any waste of effort. The teacher of mathematics, however, has to keep in mind that mental discipline is a very important part of his aim, and he must therefore take every opportunity to encourage clear logical reasoning expressed in equally clear and concise language. His choice of method, therefore, is determined by consideration of rapidity of working consistent with accuracy of working and mental discipline. To the question, which of these two latter methods is desirable? the answer is that the teacher should take the best of both methods. The written work should, for the most part, show the pupil's line of reasoning, and at the same time ensure accuracy and speed in operation. To require no analysis of the problem and no explanation at all of the mechanical work is to encourage looseness of reasoning. On the other hand, to exact too much detailed written explanation is to minimize the importance of rapidity and accuracy of working, if not to take the pupil's mind entirely from the main purpose in hand. In this connexion it should be noted that *mere labelling of numbers is not explanation*, and should be discouraged as being wasteful of time and serving no really useful purpose. The explanation should be a simple straightforward statement, clearly and concisely set out in logical sequence, of the steps involved in the solution of the problem in hand.

Again, the mind of the pupil should not be confused by insisting on forms of statements the exactness of which he does not comprehend. For instance, the statement " Area of cross section $= \frac{1}{2}(3\frac{1}{2} \times 2\frac{1}{3})$ sq. ft. " is of course to be preferred to " Area of cross section $= \frac{1}{2} \times 3\frac{1}{2}$ ft. $\times\ 2\frac{1}{3}$ ft.", but it is unwise to bother young children about these finer points to the extent of expecting them to know *why* the former is more correct. If the concrete work on which the application of the formula for the area is based has been thoroughly grasped, the pupil will fall into the habit of expressing the product which gives the area in its exact form either by imitation or intelligent acceptance thereof. The aim should be never to allow the explanations to impede the progress of the real work in hand. On the contrary, they should assist the pupil to keep a more intelligent grasp of the problem as a whole. A very valuable form of exercise which assists pupils to appreciate a well arranged solution of a problem and sets for them a standard, is to require them to supply the question, given the solution.

Practice in what has been called the business man's method, which

consists in most cases of giving the solution in one step, should be given as a special exercise for the purpose of emphasizing the importance of speed and accuracy.

### Homework

A pupil's interest in the subject can easily be killed through want of care in setting mathematical homework. It is particularly necessary in arithmetic and mathematics that the teacher should remember that one of the main purposes in setting homework is the development of the pupil's sense of power and feeling of progress. Homework which merely supplements class-work without producing the legitimate feeling of self-satisfaction resulting from a knowledge of successful achievement, tends to become a drudgery. It is impossible to exaggerate the importance of this feeling of confidence. Even when teaching the dullest pupils, the keynote of the successful teacher's work is, encouragement. Self-confidence begets keenness, and keenness in mathematical work is invaluable.

All this should be kept in mind in setting homework or other forms of individual work in arithmetic. Neither in quantity nor quality should the homework tend to destroy the pupil's interest. Too much work will, of course, produce fatigue, and fatigue will tend to destroy interest. In this connexion it should be remembered that the conditions under which children do homework vary considerably. Some will have the advantage of a quiet room, others will be surrounded by distractions. It is a good plan to let pupils choose for themselves the number of examples to be done or to require as many as can be done in the allotted time. If the pupils have developed a real, keen interest in the subject, there need be no fear that individuals will misplace the trust thus reposed in them.

The degree of difficulty of the work set for homework demands the most careful consideration. As a rule the work so set should not be beyond the power of the average or less than average pupils of the form. There is no surer way of killing interest in the subject than in repeatedly setting homework which is beyond the capacity of the pupil. It may flatter and encourage the more brilliant pupil next morning to find that he has achieved what the majority have found beyond them, but the aim should be to encourage even the most backward. In every set of homework, therefore, there should as a rule be sufficient for every pupil to do and to do well. The brighter pupils can be given the opportunity to do more examples or occasionally one or two more difficult examples may be added.

Finally the good old maxim "practice makes perfect" should not be overlooked when arithmetic homework has to be set. The new rule has to be practised in order to fix it firmly in the mind, and in its repeated application the pupil finds work well within his capacity and work which brings its own satisfaction.

CHAPTER V

# The Arithmetic Course for the Infant and Junior School

" Schemes and syllabuses there must be, and by them all must be bound within reasonable limits or anarchy will result; but their interpretation is in the hands of the teachers themselves." [1]

## The Infant School Course

One of the most gratifying features of the arithmetical work done in our schools to-day is the fact that the arithmetic taught in our infant schools goes by the name of " Number Work ", and it would be well if infant teachers would recognize the full significance of this title. One would like to see the term still used in the more advanced stages, for the more our infants and juniors are taught to think and to speak in numbers, the better will the arithmetic of the seniors be.

Up to the age of seven, then, the children should be gaining experience of numbers of concrete objects. No working by manipulation of figures should be tolerated. The introduction of the written symbol should be delayed as long as possible, and only introduced when necessity for it is really felt. The child in the kindergarten should play, think, count, and talk in numbers up to ten. The appeal should always be through the senses—hence the value of number games and number objects. Too much use cannot be made at this stage of the abacus. *We want our pupils to experience so frequently, for instance, that two and three make five, that the fact becomes a part of their subconscious being, welling up into consciousness whenever the appropriate stimulus appears.*

*Prolonged experience of number facts is what is desired at this stage.* The teacher should remember that the child who does not come to school until the age of seven often comes nevertheless with a store of these number-facts gained from experience in the home, and although not knowing, it may be, a single figure symbol, will progress quite as rapidly in the junior school as the child who has received two or more years of systematic teaching in number work. The work that such a child from an average home is able to do without previous schooling can safely be taken as a guide in determining the work of pupils up to the age of seven. Such a child can, as a rule, at least count up to a hundred and has some knowledge of addition up to ten. Further, he possesses a certain amount of knowledge, gained from experience, of our monetary system, and is usually familiar with some of the more simple fractions such as a half and a quarter.

**Syllabus.**—The following then, is suggested as a syllabus covering the years up to the age of seven:

[1] G. St. L. Carson, *Essays on Mathematical Education.*

(*a*) A thorough knowledge of all numbers up to ten gained through concrete examples and games.

(*b*) The extension of the idea of ten to two tens, three tens, and so on, up to 100.

(*c*) Counting up to 100 and recording such numbers on the abacus, thus familiarizing the pupil with the idea of positional value.

(*d*) Counting by twos, fives, and tens, up to 100.

(*e*) Learning from concrete examples the combinations of two numbers, the sum of which does not exceed ten, later extended to twelve; thus two and four make six, five and two make seven, and so on.

(This should not be done by counting but preferably by analysis of a group of things into components, and then the combinations learnt and memorized. The child should be made so familiar with these combinations in the concrete, experiencing them so frequently, that for ever afterwards the combination of, say, the numbers two and four immediately conveys the idea, six. Counting two groups of objects to find the sum should never be allowed. We appreciate later the value of familiarity with multiplication tables. The pernicious habit of counting on fingers, which persists not infrequently throughout school life and even beyond, demonstrates how little the value of *addition* tables is appreciated.)

(*f*) The inverse process, the first step in subtraction: two—how many more to make six? (The teacher says " I have six marbles here in my hands, two in this hand, how many in this?"—and so on. This complementary process to the former addition is very important.)

(*g*) Simple shopping transactions involving the use of the penny, shilling, and pound; the halfpenny and farthing; the penny in relationship to the shilling, the shilling to the pound; the sixpence, florin, and half-crown; all through concrete examples.

(*h*) Simple measurements involving the use of yard, foot, and inch.

(*i*) Practical application of the idea of one-half and one-quarter.

(*j*) Recognition of common solids and polygons: cube, prism, cylinder, pyramid, sphere. Square, rectangle, triangle, circle. These should be familiar to the children, used maybe as objects in counting and for games.

The introduction of written symbols will come just when the necessity for them is felt. No hard and fast rule can be given regarding this point, beyond stating the general fact that there is more danger in using the symbols too soon than too late. The necessary drill work should be almost entirely oral, and should be frequent. Although the value of concrete examples has been again and again emphasized it must not be thought that the importance of this drill work—sometimes called abstract drill work—is underrated. On the contrary, it is the necessary complement to the normal concrete work. Speed and accuracy are closely related, and speed in the arithmetical processes can only be secured by such thorough familiarity with the results of concrete experience that there is no stopping even to think, much less obtaining by counting what, say, four and five make.

## The Junior School Course

In the discussion on the infant school course, emphasis has been placed on the importance of gaining knowledge by direct appeal to the senses of the elementary arithmetical facts concretely, thus ensuring an intelligent understanding of the very foundation of the subject. Skill in written symbolic arithmetic has been regarded as relatively unimportant at this stage.

In considering the junior school course, however, the teacher has to keep in mind that the pupil has now reached the stage when he is expected to become proficient in the use of the mechanical tools designed for the purpose of performing computation less laboriously and more speedily and accurately than is possible by ordinary unaided mental processes. Psychologically this is the period during which the pupil can best acquire those habits of thought which will ensure accurate and speedy work. The teacher of the senior school knows only too well how extraordinarily difficult it is to give to boys above the age of eleven and twelve that training in arithmetical speed and accuracy which should have been acquired between the ages of seven and eleven.

*In the junior course, then, whilst the extension of the knowledge of fundamental arithmetical facts must still be arrived at through concrete experience and appeal to the senses, thorough and systematic drill is of the utmost importance.* Accuracy in computation must become a habit. The addition and multiplication " tables " and the inverse processes must be known so thoroughly as a result of continuous drill that the pupil shows no hesitation in supplying, quickly and accurately, whatever arithmetical fact is at the moment required. It is no use being misled by the cry that any intelligent pupil can find out what six sevens are whenever he requires it. Having discovered it once, he should commit it so well to memory that he will never have to waste time to rediscover the fact in order to use it when necessity arises. Life demands that we carry out automatically as many processes as possible, and in our desire to relieve the child of the drudgery and monotony of learning by rote, formerly called arithmetic, we must not overlook the very important fact that, without making it the beginning and the end of our teaching, constant drill work is absolutely essential. Experienced teachers will agree that pupils in the junior school thoroughly enjoy this type of work. They take a pride in it, and the more proficient they become the more they gain in self-confidence and even self-respect. The junior school stage is predominantly the period for acquiring skill in the use of the " tools " of the subject.

Finally, there should be no sudden break in the methods adopted in the first year of the junior school and those employed in the infant school. Work should still be largely oral, the written work being confined almost entirely to writing answers to examples which have been dictated.

The junior school course should include the following:

**First Year (ages 7–8).**—(*a*) A thorough revision of the combinations of two numbers which do not exceed **10**, with subsequent extension

to 20. The inverse process, viz. "Seven and how many to make fifteen?"

(*b*) Addition of series of three or four numbers, (i) in vertical column, and (ii) horizontal column, total not exceeding 20.

(*c*) Addition by series to 100 as follows:

$$2 + 2,\ 12 + 2,\ 22 + 2, \text{ \&c.}$$
$$2 + 3,\ 12 + 3,\ 22 + 3, \text{ \&c.}$$
$$2 + 4,\ 12 + 4, \text{ and so on.}$$

(*d*) Counting by 2's, 3's, 4's, &c. For example, counting to 100 by 2's beginning with 0, with 1, with 2, and so on. The reverse process of counting down from 100. Much time should be devoted to drill in these various ways of counting, all making for speed and accuracy in addition and subtraction and laying a sound foundation for the multiplication tables.

(*e*) Addition of series of two-figure numbers, (i) in vertical columns, (ii) in horizontal columns, the sum not exceeding 100. Subtraction from any two-figure number.

(*f*) Construction of and thorough mastery through constant drill of multiplication tables up to $6 \times 12$. Equal attention to be given to these tables as preparation for division, e.g. How many 5's in 45? and so on. Short multiplication and division.

(*g*) Pence table up to 120 pence. Oral and written work in addition, subtraction, multiplication, and division of money, sums not to exceed £1. This work, however, to be mainly oral.

(*h*) Further exercises in measuring lengths. The pint and quart.

Simple problems involving use of arithmetical facts and processes mentioned above and of the familiar fractions $\frac{1}{2}$ and $\frac{1}{4}$, but requiring little written work.

**Second Year (ages 8–9).**—(*a*) Extension of the above work in numeration to numbers up to 1000. Counting should first be by 100's to 1000, then completely to 1000. Drill in counting forwards and backwards by 2's, by 3's, &c., from any starting-point should be continued as further exercise in the addition tables as well as in some cases forming the multiplication tables.

(*b*) Construction and thorough mastery of tables at least up to $10 \times 10$, extending to $12 \times 12$ if time permits. Again too much emphasis cannot be placed on pupils' thorough familiarity both with addition and multiplication tables.

(*c*) Addition in vertical and horizontal arrangements, sum not to exceed 1000. Subtraction from numbers not exceeding 1000. Multiplication and division similarly extended but multiplier and divisor being unit figures only.

(*d*) Extension of knowledge of monetary system up to sums of £10 and use of four rules therein.

(*e*) Extension of work previously done in weights and measures: inch, foot, yard; ounce, pound, cwt., and ton; pint, quart, gallon; seconds,

minutes, hours, days. Whilst little can be done by way of problematic work in weights and measures at this stage, yet it is not too early to familiarize pupils with these various units.

(*f*) The meaning of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{8}$, $\frac{1}{10}$, and $\frac{1}{12}$.

(*g*) Addition of two-column figures, multiplication of two-figure numbers.

In this second year the work again should be mainly oral, the problems dealt with requiring little written work. The pupils should become accustomed to the forms "the sum of", "the difference between", as variations of "add" and "subtract", and also to the signs $+$, $-$, $\times$, $\div$, and of course $=$.

**Third Year (ages 9–10).**—In this year there should be a thorough revision of the fundamental processes applied to numbers and money. This revision should take the form:

1. Ample drill in the fundamental arithmetical facts included in addition and multiplication mainly through oral or mental work.
2. Speed and accuracy tests in purely mechanical exercises.
3. Problems requiring the use of the fundamental processes.

It is most important at this stage that, whilst much time has to be devoted to entirely new work, practice in the fundamental processes should be continued. Much of the inaccuracy which is evident in later years is due to the fact that, whilst the pupil is devoting time to the study of such new work as fractions, for instance, he is using multiplication tables to less extent than previously, and therefore loses to a certain degree the facility with which he previously employed them. Moreover, this repeated return to the more elementary work proves very stimulating to the pupil. He finds that he is more and more sure of himself, and in consequence tackles the newer work with more confidence and greater interest.

The new work will include:

(*a*) Further extension of numeration counting up to a million by thousands. Ample practice in writing large numbers in figures, from dictated words and vice versa.

(*b*) Vulgar fractions. Easy examples in addition and subtraction.

(*c*) Further examples in use of weights and measures introduced in previous year. Fundamental rules therein. Reduction.

(*d*) Mensuration. Perimeter and area of rectangle.

(*e*) The metre, centimetre, and millimetre.

(*f*) Decimal fractions—the first four rules applied to easy practical examples in measuring lengths and calculating areas.

For methods to be adopted in vulgar and decimal fractions see p. 246. With regard to the work in numeration and the extension thereof, as stated above, the counting should be done by thousands. The pupil should gain a very clear conception of the relationship between a thousand and a million. Ample practice should be given at this and subsequent stages in the translation from numbers dictated in words into figures, and from figures into

words. Recent investigations by the Board of Education Inspectors revealed the fact that 34 per cent of children in Standard V were unable to write in figures the dictated number, ten thousand and ten; whilst 80 per cent of them failed to take ten thousand and one from one million. The weakness is due partly to want of practice in numerical dictation and translation, but mainly to the much more serious fault of paying more attention to figures and insufficient attention to numbers. The proper punctuation of numbers, too, by use of the comma, should be insisted upon.

Some idea of the size of a million should be given. Pupils should calculate how long it would take them to count a million, first timing themselves in counting to a hundred. Other methods of comparison might with advantage be employed. The pupils might be set to calculate, for instance, how many journeys round the earth, given its approximate circumference, would be required to cover a distance of a million miles. Interesting excursions into astronomical distances might also be made.

All such calculations will help to form a clearer conception of very large finite numbers. When, for instance, the pupil realizes that it would take up about one whole term of school life to count a million, he has a better conception of the number—it is now something more than " one, followed by six noughts ". And it is very important at this stage, when the pupil is becoming accustomed to using larger numbers, that they should be something more to him than mere figures. Whilst stressing the importance of speed and accuracy in mechanical working, at the same time it is essential that the pupil is " thinking in numbers " the whole time and not merely manipulating figures and symbols.

**Fourth Year (ages 10–11).**—The foregoing syllabuses aim at ensuring that, by the age of ten, a pupil of average intelligence will have thoroughly mastered the tools he is to employ, including addition and multiplication tables and the fundamental processes known as the first four rules. In addition he has covered a good deal of work in weights and measures, has a fair knowledge of vulgar and decimal fractions, and has done some elementary mensuration.

It is recognized that the ground thus covered is more than is usually attempted in the first three years. It is maintained, however, that this can be done if written arithmetic is reduced to a minimum, especially in the first two years. Even in the third year, the working of long " sums " and the setting out of lengthy explanations are not required. If the constant aim has been to get as much *arithmetic* as possible done in the arithmetic lesson rather than as much figure manipulation between neatly ruled lines, then speed and accuracy in the use of the arithmetical tools will have been ensured.

Nevertheless, it is unwise to assume that all can run the same race in the same time. It is at this stage that the teacher should carefully differentiate between the pupils who will need considerably more practice in the work already attempted and those who can, with profit, go on to more advanced work. Two syllabuses may therefore now be advisable; one for pupils

of no more than just average intelligence, and the other for pupils of good average, or above average, intelligence.

SYLLABUS A.—For pupils (ages 10–11) of just average ability.

A thorough revision of the previous work applied as far as possible to concrete examples, either of a practical nature or drawn from everyday life. In particular attention will be given to:

(*a*) Multiplication and division (money, weights, and measures). Reduction.

(*b*) Factors, multiples, and all processes in fractions. Easy examples only.[1]

(*c*) Mensuration of the rectangle. Square measure.

(*d*) Further examples, of an easy type, in decimals.

SYLLABUS B.—For pupils (ages 10–11) above average intelligence preparing to enter secondary, central, or senior schools.

(*a*) Memorizing weights and measures tables. For such pupils this can be regarded almost entirely as memorizing work. The amount of time devoted to working examples thereon need not be very great.

(*b*) Prime numbers. Factors, multiples. Simple cases of L.C.M. and H.C.F. Fractions. Reduction and the four rules.

(*c*) Mensuration of rectangle, triangle, and circle. Square measure. Square root.

(*d*) The metric system and further and more difficult examples in decimals.

(*e*) Simple proportion and proportional parts. Method of unity. Percentages, easy examples.

(*f*) Averages. Practice.

Throughout both courses speed tests in the more elementary work should be given as frequently as possible, interest in these tests being secured by such means as recording results or forming teams to compete with one another.

Pupils who have worked through syllabus A may proceed to syllabus B during the following year. The subsequent work done by these pupils of just average ability will depend very largely on the type of school to which they are transferred, but as a rule their course will be to follow the more practical parts of the senior course. Considerable attention at the same time should be given to the practice of the more elementary work.

[1] Complex fractions should be rigorously excluded.

CHAPTER VI

# The Arithmetic Course for the Post-Primary School

When the syllabus for the post-primary course (senior, central, or secondary school) for pupils of eleven to fifteen years of age and over comes to be considered, it has to be remembered that such pupils are approaching the age when interest is more and more being transferred from the purely mechanical use of the tools to the scientific principles underlying their application.

Nevertheless proficiency in mere numerical calculation has to be maintained, and pupils who have been promoted to central schools as being those who are at least a little above the average in intelligence, should never be allowed to consider accuracy as being of secondary importance. Frequent speed and accuracy tests, with interest and enthusiasm for such aroused it may be by purely artificial means, should be given. Such tests should be of two types, (*a*) those in which questions require answers only to be written, and (*b*) those designed to test speed and accuracy in the purely mechanical written work.

Both sets of tests should, in addition, serve the very useful purpose of constantly revising, and therefore keeping fresh, work done in previous years. (The mathematical master should take the necessary steps to ensure that uniform methods are employed in the mechanical work throughout the school. Agreement should be reached between the science and mathematics departments, for instance, on such points as the particular method to be employed in multiplication and division of decimals.)

It should also be remembered that, whereas during the junior course, explanations of the processes employed have never been required of the pupil, he has now reached the stage when such explanations will have a real interest for him. Previously the teacher was satisfied if the explanation *he* gave to the pupil of any particular process was understood at the time; now, however, fuller consideration of the underlying reasons for the particular method employed in the various arithmetical processes will help to arouse fresh interest therein.

The arithmetic of the post-primary course proper will be concerned too with underlying principles. At the same time the application of arithmetical processes to the world of everyday affairs is now of paramount importance. Call it what we will, business or commercial arithmetic, technical or industrial arithmetic, the pupil's interest is all the keener if he feels that the work in which he is engaged bears some relationship to the larger world outside. Not only should problems which bear no resemblance to real experience be rigorously excluded from the course, but every effort should be made to secure examples from the business world of the immediate neighbourhood as well as from the world at large, drawn from municipal

and national affairs. It is, for instance, absurd to ask pupils to find the cost of 15 tons, 5 cwt., 14 lb., 3 oz. of coal at £2, 15*s.* 6*d.* per ton—for the very obvious reason that the purchase of such a quantity of coal is never made. To ask the pupils the cost of carriage on 3 tons, 16 cwt., 3 qr., 18 lb., at £1, 3*s.* 6*d.* per ton, is to ask a question which has some relationship to real experience. When, however, problems are drawn from actual business transactions, as they can be if a little trouble is taken, the interest is increased very considerably.

The relationship of the subject to other branches of mathematics is another important aspect of the work of the post-primary course. The written arithmetic must be considered from the point of view of the exactness and conciseness of the statements used and their logical sequence. Such work will take on, as it were, a new aspect. Hitherto the written arithmetic has been regarded mainly as a mechanical aid to the mind. Now it is to be considered more as a statement of mathematical reasoning, and more importance will be attached to the manner in which the solution of the problem in hand is set forth.

The following syllabuses are intended to be suggestive only. In the post-primary course the teacher must exercise a good deal of initiative in his selection of material and in the details of the work to be attempted. He must, for instance, be guided partly by the mental capacity of his pupils and also by the demands which their future careers are likely to make. Broadly speaking, he will have at least two types of pupils to consider, the more practically minded but not necessarily less intelligent pupil, and the pupil to whom the more academic side of the work appeals. The syllabuses set out below are intended to cover a general course suited more or less to both types of pupils, and it is left to the teacher to decide to which parts of the syllabus he must devote the major portion of the time at his disposal.

### First Year (ages 11–12)

(*a*) A thorough revision and extension of previous work with special attention to factors, L.C.M., and H.C.F.[1] Fractions, decimals, and decimalization. The metric system.

(*b*) Measurement of angles, heights, and distances with practical examples, using simple or home-made instruments for measuring angles. Areas of rectangles and triangles, parallelogram, rhombus, trapezium, circle; field work. Use of symbols to express areas.

(*c*) Revision and extension of work of junior course in averages and percentages, ratio and proportion, profit and loss.

(*d*) Statistical graphs.

### Second Year (ages 12–13)

(*a*) Revision and extension of previous work, with special reference to ratio and simple proportion, averages and percentages; square root.

[1] Where pupils are drawn from several schools, considerable time may have to be devoted to such revision if unsuitable methods have to be eliminated.

(*b*) Compound proportion.

(*c*) Simple interest.

(*d*) Further examples in areas. More difficult examples in field work. The right-angled triangle and the equilateral triangle. Volume of prism and cylinder, pyramid and cone.

(*e*) Factors and indices. Law of Indices treated from such statements as:

$$8 \times 16 = 2^3 \times 2^4 = 2^7$$

and thence $$a^3 \times a^4 = a^7.$$

(*f*) Logarithms. Easy examples in multiplication and division.

(*g*) Statistical graphs and simple deductions therefrom.

**Third Year (ages 13–14)**

(*a*) Revision and extension of previous work.

(*b*) More difficult computations using logarithms, including finding roots and powers of numbers. The slide rule. Use of logarithms in formulæ evaluations.

(*c*) Mensuration. More difficult examples in work previously done, including examples requiring use of logarithms or slide rule.

(*d*) Variation and graphs. $y \propto x$. $y \propto \frac{1}{x}$. The "gradient" of a curve.

(*e*) Simple interest revised. Discount and commission; banking; compound interest; simple and compound interest compared graphically.

**Fourth Year (ages 14–15).**—Revision and extension of previous work, with special reference to future careers. The work will therefore be designed to meet the requirements either of:

1. Those entering upon engineering or industrial careers, in which case logarithms, the slide rule, and graphical work will receive most attention.

2. Those entering upon commercial careers, in which case percentages, profit and loss, simple and compound interest, discount and commission, banking, stocks and shares, will form the chief part of the syllabus.

3. Those who during the following year may be taking a School Certificate Examination, in which case a more general revision of the whole with special reference to method would be the most satisfactory course to be followed.

It should, however, be noted that the syllabuses of the first three years cover a very wide field, and some teachers may prefer to spread the work over four years. As already mentioned, the syllabuses, which are fairly exhaustive, are only intended to be suggestive. Teachers should take into consideration both the mental capacity of the pupils and their possible future careers before determining the details of the work to be attempted.

## CHAPTER VII

# Notes on Arithmetical Methods

In the following notes on arithmetical methods only such branches of the subject are dealt with as those in which a choice of method is before the teacher, or those in which the method presents some special difficulty, or is of special importance. The notes are not intended to take the place of the textbook, but rather to supplement it.

### The Fundamental Rules

The immense importance of the teaching of sound methods in the early stages of arithmetic cannot be over-estimated. It is a very significant fact that the methods taught us in our arithmetical infancy, be they ever so bad, have a tendency to persist through life. So marked is this tendency that experienced teachers are inclined to leave the pupil to follow whatever methods have been taught him in his infancy, provided he can perform the operation expeditiously and accurately. It is claimed, and not without good reason, that attempts to change familiar methods for others tend to confuse the mind of the pupils and entail a good deal of wasted effort. If the change in methods can be effected not later than the age of ten, and pursued vigorously for a couple of years, there is considerably less risk of ultimate decline in accuracy. If, however, these unsound methods have been used until the age of twelve, change of method is apt to aggravate the tendency towards inaccuracy peculiar to the years of puberty. It is this difficulty which emphasizes the importance of teaching sound methods from the earliest stages.

### Addition and Subtraction

The two are here purposely taken together, for they should be regarded as very closely allied processes. The facts that 6 requires 3 to make 9 and 3 requires 6 to make 9 should be taught almost at the same time as the facts that 6 and 3 make 9 and 3 and 6 make 9. Subtraction and addition should be taught almost simultaneously, and the former will then be a natural process instead of a very mechanical and difficult one. The special points concerning methods in teaching addition and subtraction which must be regarded as important are as follows:

(*a*) The addition (and subtraction) tables should be thoroughly well known. The facts should first be understood from experience, and then so well memorized that whenever the pupil is required to add or subtract any two single digit numbers, he should be able to give the answer quite automatically. The pupil not only learns, for instance, that 9 and 8 make 17, but the fact should become so thoroughly a part of his experience that the stimulus $9 + 8$ calls forth immediately the response 17.

(*b*) Much practice should be given in the addition of single digit figures arranged in vertical columns and in horizontal lines. The mental work employed in this process should from the first be merely that of *registering the successive sums.* For example, $6 + 3 + 8 + 7 = 24$. The pupil should say 9, 17, 24—not, 6 and 3 are 9 and 9 and 8 are 17. This, be it noted, is only an extension of what has just been advocated. The stimulus $6 + 3$ should automatically call up the response 9, the stimulus of this number in the mind and the 8 should automatically give the response 17, and so on.

Such automatic response cannot be secured without constant practice. Not infrequently teachers who advocate thorough familiarity with multiplication tables do not recognize the importance of similar intimate knowledge of the addition and subtraction tables.

(*c*) The first step in adding two digit numbers together should be by way of examples such as the following:

$$4 + 3 = \;, \qquad 14 + 3 = \;, \qquad 24 + 3 = \;,$$

and similarly in subtraction. The pupil should not only know that, say, 4 and 3 make 7 but that the addition of any two numbers ending in 4 and 3 will be a number ending in 7.

(*d*) Practice in the addition of series of two-figure numbers either in vertical columns or horizontal lines should now follow. In this connexion encouragement should be given to those who are able to add number to number instead of adding units first and then tens. There is room here for considerable experiment. The process is as follows:

$$24 + 35 + 17 + 49 = 125.$$

The pupil mentally registers in turn the numbers 54, 59, 69, 76, 116, 125, adding first the ten and then the unit. Ability to carry out this method depends, of course, upon the mental capacity of the pupil and is largely a question of training pupils to register figures in their minds, but more should be done to encourage individuals to adopt this method.

(*e*) In all cases of addition of series of numbers answers should be checked by adding the numbers in the reverse order. Accuracy should be encouraged right from the earliest stages.

(*f*) Subtraction. Three methods are available.

1. DECOMPOSITION METHOD. The extended working is as follows:

$$\begin{array}{rcrcr}
434 & = & 400 + 30 + 4 & = & 300 + 120 + 14 \\
\underline{186} & = & \underline{100 + 80 + 6} & = & \underline{100 + \;\;80 + \;\;6} \\
 & & & & \underline{200 + \;\;40 + \;\;8}
\end{array}$$

This is usually condensed thus:

$$\begin{array}{ccc}
3 & 12 & 14 \\
\cancel{4} & \cancel{3} & \cancel{4} \\
\underline{1} & \underline{8} & \underline{6} \\
\underline{2} & \underline{4} & \underline{8}
\end{array}$$

The procedure is as follows: (i) 6 from 4 we cannot. Add 1 ten from the tens in the top line to make 14. 6 from 14 leaves 8. (ii) 8 tens from 2 tens we cannot. Add 10 tens, making 12 tens, from the hundreds in the top line. 8 tens from 12 tens leaves 4 tens. 100 from 300 leaves 200.

II. Method of Equal Additions.

$$\begin{array}{rcrcl}
434 & = & 400 + 30 + 4 & = & 400 + 130 + 14 \\
\underline{186} & = & \underline{100 + 80 + 6} & = & \underline{200 + \ \ 90 + \ \ 6} \\
 & & & & \underline{200 + \ \ 40 + \ \ 8}
\end{array}$$

Condensed this becomes:

$$\begin{array}{ccc}
 & 13 & 14 \\
4 & \cancel{3} & \cancel{4} \\
2 & 9 & \\
\cancel{1} & \cancel{8} & 6 \\
\hline
2 & 4 & 8 \\
\hline
\end{array}$$

The procedure is as follows. 6 from 4 we cannot. Add 10 units to the top and 1 ten to the bottom. 6 from 14 leaves 8. 9 tens from 3 tens we cannot, add 10 tens to the top line making 13 tens and 100 to the bottom. 9 tens from 13 tens leaves 4 tens. 2 hundreds from 4 hundreds leaves 2 hundreds.

III. Complementary Addition Method.

$$\begin{array}{rcl}
434 & = & 400 + 30 + 4 \\
\underline{186} & = & \underline{100 + 80 + 6} \\
\underline{248} & & \underline{200 + 40 + 8} \\
11 & & 100 \quad\ 10
\end{array}$$

This method presupposes the familiarity with the subtraction table allied to the addition table already advocated. The pupil knows that the answer when added to the bottom line gives the top line. His task, therefore, is to find the missing number. Thus: 6 and (8) make 14; carry 1 ten; 9 and (4) make 13; carry 100; 2 and (2) make 4. He is adding the whole time, and therefore has no difficulty in appreciating the necessity for "carrying".

Dr. Ballard in his *Mental Tests* refers to an extensive investigation made into the relative merits of the first two methods and reaches the conclusion that the second method, that of equal addition, was from the point of view of speed and accuracy much more effective; in fact, for children of the lower standards it proved to be 50 per cent better. The decomposition method, from the teacher's point of view, is attractive, especially in the early stages. It can easily be explained in most cases, though it is very confusing and difficult to understand when subtracting from large round numbers, such as 1000 — 157. The method doubtless presents less difficulty to the pupil if called upon to explain what he has done. This does not necessarily prove that he understands it better at the time. Moreover explanations from the pupil at this stage are not required. We are placing in his hands a tool which he is required to use, once he has understood its use. The

better tool is surely the one which he uses with the greater degree of accuracy and confidence. Teachers will therefore be well advised to leave the decomposition method alone.

The third method, that of complementary addition, is to be advocated on the ground that it is the method which should have been made familiar to the pupil from the very commencement of his work in arithmetic. It is not yet widely enough in use to test its effectiveness from the point of accuracy and speed, but inasmuch as it is so closely akin to the method of equal addition, this can hardly be questioned. It almost compels an immediate check being made and therefore has much to commend it. It is of course the shopkeeper's method, and there is certainly much to be said in favour of teaching the pupil a method which will enable him to test his change as rapidly as the shopkeeper presents it. *The one very great point in its favour, and on account of which it should certainly be taught from the earliest, is that it is the mathematician's method.* It can be applied immediately to algebra; thus:

$$\begin{array}{r} 3x - 5y + 2z \\ \underline{5x - 3y + 8z} \\ \underline{-2x - 2y - 6z} \end{array}$$

Here we say, $5x$ and $(-2x)$ make $3x$; $-3y$ and $(-2y)$ make $-5y$; $8z$ and $(-6z)$ make $2z$.

The writer has found that pupils of twelve who dislike change of method in multiplication and division not only are easily reconciled to the change in favour of the complementary addition method in subtraction, but become very keen and quickly adapt themselves to the change.

**Addition and Subtraction of Money, &c.**—A doubt exists in the minds of many teachers as to whether, in the addition of money, a pupil should be taught to add as in ordinary addition, converting the sum of pence into shillings and so on, or whether to make up shillings as the addition proceeds. There is much to be said in favour of encouraging the latter direct method—again the shopkeeper's method. Thus, the addition of 1s. 6½d. + 2s. 5d. + 4s. 9¾d. should proceed, 3s. 6½d., 3s. 11½d., 7s. 11½d., 8s. 9¼d. The process, however, may be difficult to some, and where the amounts are large it is better to add up each denomination as units and convert the sum, thus confining the work to the common notation.

In subtraction, however, the third method described above, that of complementary addition, i.e. the shopkeeper's method, is unquestionably the best.

The above remarks on addition and subtraction of money apply also to addition and subtraction in weights and measures.

## Multiplication

Thorough familiarity with multiplication and division tables is essential. Recitation of tables is probably more useful than the writing of them. The teacher should devise ample variation of methods, drilling and testing orally.

Pupils should be required to say the tables forwards, backwards, odd numbers, even numbers, and so on. In addition to rapid questioning, which helps to keep pupils alert, speed tests in writing out a series of items from the tables should be given frequently. The teacher must use his ingenuity in devising methods which will help to maintain interest and secure alertness in this very necessary drill.

**Short Multiplication.**—The first real step after tables in multiplication is that required to find the product of, say, 17 and 3. The problem may be presented thus. In each of three baskets there are 17 oranges. How many are there altogether? The pupils should be asked to find the answer. As pointed out on p. 218, if to the pupil's mind the number 17 conveys not the *figures* 1 and 7 but the *numbers* 10 and 7, many if not all will obtain the answer by mentally adding 30 and 21. Others may write down the 17 three times and add them together. But in so adding they will quickly see that their multiplication table shortens the process. A number of such problems should be given as rapidly as possible: 5 baskets with 16 in each, How many? 9 baskets with 15 in each; and so on. One of two things will happen: either some pupils will write down only once the number contained in each basket and use only their multiplication table to obtain the answer, or they will all be ready to appreciate the advantage of so doing. *In other words the necessity for and the advantage of the mechanical process will be realized.*

**Long Multiplication.**—The steps in teaching long multiplication are as follows:

1. $3 \times 3 = 9$; $30 \times 3 = 90$; $300 \times 3$ is 900. Repeat until the rule is obtained, to multiply by 200, 300, 400, &c., multiply by 2, 3, 4, &c., as the case may be and add two noughts, or, put 0 for the unit figure, 0 for the tens, and then multiply by 2, 3, 4, as the case may be.

2. Give practice in such examples as $127 \times 30$; $4569 \times 100$; $359 \times 400$; $270 \times 500$.

3. Take the first example in (2) i.e. $127 \times 30$, and ask how the following can be worked, $127 \times 32$. The answer should be readily forthcoming. Multiply first by 30 and then by 2. The working will be done on the blackboard as follows:

$$\begin{array}{r l}
127 & \\
\underline{32} & \\
3810 & = 30 \text{ times } 127 \\
\underline{254} & = \phantom{3}2 \quad ,, \quad 127 \\
\underline{4064} & = 32 \quad ,, \quad 127
\end{array}$$

The explanatory matter to the right will not, of course, be given in later examples. Multiplying first by the figure of highest denomination is here advocated because, (*a*) It comes naturally to the pupil to do so as explained on p. 218. (*b*) The first product thus obtained is nearest the complete answer. (*c*) The method is much to be preferred in multiplication of decimals, when the reasons given above in (*a*) and (*b*) have far more

significance. (*d*) The method is the only one that can be employed in contracted multiplication.

### Division

It has already been mentioned that at the time pupils are learning their multiplication tables they should learn the reverse form of the table, that is to say that when learning $8 \times 6 = 48$, they should as soon after as possible learn that 8 is contained in 48, 6 times, or " 8's in 48 goes 6 ". The close association of these two facts helps to fix each in the mind, and the pupil is laying a sound foundation for quick and accurate work in division as in multiplication. The pupil should appreciate the fact that division is the reverse process to multiplication.

**Short Division.**—Treatment of the " remainder ". Little if any difficulty is experienced in teaching short division. The only point that calls for comment here is the treatment of the remainder. The statement $49 \div 4 = 12 + 1$ is, of course, ridiculous, and remainders should never be expressed in this manner.

If the written mechanical work is developing, as it should do, out of the mental work, then in such simple cases as the above the statement $49 \div 4 = 12\frac{1}{4}$ is perfectly intelligible to the pupil. Further, it is of course true that, at the stage at which the pupil is taught short division, only such simple fractions as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{3}{4}$ are understood, but the pupil can quite easily understand that when, for instance, 379 is divided by 5 the answer is 75, and that 4 more remain to be divided. He will quite readily accept the statement that $\frac{4}{5}$ means that 4 more remain to be divided by 5. We are, in fact, giving him another symbol. His work then becomes:

$$\begin{array}{r} 5\overline{)379} \\ \hline 75\frac{4}{5} \end{array}$$

The same applies to " remainders " in long division. We are satisfied if the pupil accepts $\frac{4}{15}$ as the symbolic way of writing " 4 more remain to be divided by 15 ", $\frac{29}{51}$ as the symbolic way of writing " 29 more remain to be divided by 51 ".

Short division of money should proceed with ordinary short division.

**Long Division.**—The teacher will be wise in recognizing quite frankly that long division is a very difficult process for young pupils to understand, and that it is better to assume that the understanding will come later. The pupil is introduced to the process step by step and accepts it rather than learns it in the sense of understanding *why* the process " works ". That it does work is convincingly proved by multiplication. The steps in the demonstration are as follows:

1. Work on the blackboard by the long division method a sum, such as $2536 \div 4$, which can be worked and is worked by short division.
2. Give the pupils several examples to work for themselves.
3. Call attention to the similarity between the two processes.
4. Set the pupils to attempt to work an example such as the following by the *short* and then the long division methods: $198 \div 15$.

Note that the example should be an easy one involving a division by a number of which the table is not known, i.e. above 12.

5. Gradually increase the difficulty of the example, still using fairly easy divisors in order that both methods can still be employed. The pupils will begin to appreciate the utility of the long division method.

6. Finally set an example of the type $1487 \div 48$, in which short division involves considerable difficulty and much margin work.

7. The pupils, convinced of the value of the new tool, are quite prepared to become proficient in its use *without, at this stage, entering into an exhaustive explanation of the underlying principles.* Considerable practice should now be given first with two-figure divisors in which the units figure is not above 3 or 4, in order that the quotient figure can be readily found, and later with two-figure divisors with a units figure above 5.

*Example 1.*

$$
\begin{array}{r}
74 \\
62\overline{)4593} \\
\underline{434\phantom{0}} \\
253 \\
\underline{248} \\
5
\end{array}
$$

Answer. $74\frac{5}{62}$.

The quotient is obtained thus: 62 is approximately 60. 60 into 4 thousands will not "go" any thousands. 60 into 45 hundreds will not "go" any hundreds. 60 into 459 tens will go 7. In practice this is shortened to 6 into 45, &c.

*Example 2.*

$$
\begin{array}{r}
67 \\
68\overline{)4593} \\
\underline{408\phantom{0}} \\
513 \\
\underline{476} \\
37
\end{array}
$$

Answer. $67\frac{37}{68}$

Here 68 is nearer 70 than 60, and hence we say 7 into 45 goes 6, and therefore 68 into 459 goes 6, and so on.

Division by factors as a method of bridging the difficulty experienced by young pupils in going from short to long division is not advocated. Division by factors only postpones the difficulty for a short while, since it is only applicable in certain cases.

## Long Multiplication and Division of Money, &c.

In what is termed compound long multiplication the single-line method in column form is much to be preferred.

*Example 1.* £17, 14s. 8½d. × 63.

| | | |
|---|---|---|
| £17, | 14s. | 8½d. |
| | | 63 |
| £1117, | 6s. | 7½d. |
| 46 | 44 | 31 |
| 630 | 630 | 504 |
| 441 | 252 | 535 |
| 1117 | 926 | |

Answer. £1117, 6s. 7½d.

It will be noticed that no working is shown for the conversion of the 535 pence into 44 shillings and 7 pence, nor for the 926 shillings into 46 pounds and 6 shillings. Pupils should be encouraged to do work mentally as much as possible. In these cases it is not difficult to do so inasmuch as the figures when obtained are placed in their immediate columns.

*Example 2.*—13 tons 5 cwt. 3 qr. 7 lb. × 23.

| | | | |
|---|---|---|---|
| 13 tons | 5 cwt. | 3 qr. | 7 lb. |
| | | | 23 |
| 305 | 13 | 2 | 21 |
| 6 | 18 | 5 | 28)161 |
| 299 | 115 | 69 | 140 |
| 305 | 133 | 74 | 21 |

Answer. 305 tons 13 cwt. 2 qr. 21 lb.

The column method of arranging long division has much in its favour, and is here recommended partly because of its neat and compact form and also because it avoids "putting down multiplication sums" which should be done mentally.

*Example 3.*—£538, 14s. 1½d. ÷ 52.

| | | | |
|---|---|---|---|
| £ 10, | 7s. | 2¼d. | |
| 52)£538 | 14s. | 1½d. | |
| 52 | 360 | 120 | 68 |
| 18 | 374 | 121 | 70 |
| | 364 | 104 | 52 |
| | 10 | 17 | 18 |

Answer. £10, 7s. 2¼d. Remainder 18 farthings.

The same method is applicable to division in weights and measures.

## Fractions

The youngest child comes to school equipped with some very useful knowledge concerning fractions. He knows, for instance, what is meant by "half an apple", and he may be acquainted with the fact that a scone easily divides into four parts. In other words his idea of fractions is con-

nected with partitions and divisions. The teacher will do well to make full use of the elementary notion of fractions which every child possesses and, building on this, develop the mathematical conception of a fraction as " one or more of aliquot parts into which the unit is divided ". A knife and a few apples or potatoes will prove far more effective instruments for teaching fractions than lines, circles, and rectangles drawn on the blackboard, and will save much time. The shilling and its twelve parts, the foot rule and its twelve parts, the pound with its two half-sovereigns, its ten florins, its eight half-crowns, its twenty shillings, all natural and well-known ready-to-hand instruments, are infinitely better than the less familiar and quite artificial diagrammatic units. Briefly, the steps [1] in teaching " fractions " are as follows:

I. (*a*) The recognition of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, by actual partition and reference to known fractions of familiar units.

(*b*) $\frac{1}{2}+\frac{1}{2}$, $\frac{1}{2}+\frac{1}{4}$, $\frac{1}{4}+\frac{1}{8}$, &c. $1\frac{1}{2}+1\frac{1}{2}$, $2\frac{1}{2}+1\frac{1}{4}$, and so on. At first all such exercises should be worked as concrete examples. Blackboard and paper work will be employed only after ample time has been devoted to the concrete examples.

II. $\frac{1}{2}=\frac{2}{4}$, $\frac{1}{4}=\frac{2}{8}$, $\frac{1}{2}=\frac{4}{8}$, $\frac{1}{3}=\frac{2}{6}=\frac{4}{12}$, and the reverse $\frac{2}{4}=\frac{1}{2}$, &c.

Examples such as:

$$£\tfrac{1}{2}+£\tfrac{1}{8}=10\text{s.}+2\text{s. }6\text{d.}=12\text{s. }6\text{d.}$$

also $$£\tfrac{1}{2}+£\tfrac{1}{8}=£\tfrac{5}{8}=12\text{s. }6\text{d.};$$

that is, examples in adding fractions first in the concrete form and then in the fractional abstract form.

III. Ample exercises in adding and subtracting easy fractions, such as $\frac{1}{2}+\frac{3}{8}+\frac{3}{4}$; $\frac{3}{4}-\frac{1}{8}$.

Later such examples as $1\frac{1}{2}+2\frac{3}{8}+5\frac{3}{4}$; $5\frac{3}{4}-1\frac{1}{8}$; and later still $4\frac{1}{4}-2\frac{1}{2}$; $3\frac{1}{8}-2\frac{3}{4}$.

IV. Multiplication of fractions. $\frac{1}{2}$ of $\frac{1}{4}$, &c.

Division of fractions, i.e. how many times is $\frac{1}{8}$ contained in $\frac{1}{4}$, in $\frac{1}{2}$, &c.

V. Harder examples in all four rules without reference to L.C.M. and H.C.F., e.g. $\frac{1}{4}+\frac{1}{3}$.[2]

VI. Factors. Multiples. H.C.F. and L.C.M.

VII. All four rules applied to any fractions.

Such a course of lessons covering the whole of the necessary work in fractions need not be continuous. Easy examples, plentiful in number,

[1] N.B.—Each "step " constitutes at least one lesson to be followed by ample exercise and "drill ".

[2] If ample mental work has been given up to this stage there should be no difficulty in obtaining the suggestion that each fraction here should be converted into twelfths. Even at this stage revision of earlier and easier examples and reference to the foot rule will be of more use than diagrams.

are to be preferred to a few difficult and complicated ones. Complex fractions should be omitted entirely. Further, whilst the examples should certainly supply the necessary drill in working fractions, the application of fractions to a variety of problems should form a fair proportion of the work.

### Decimal Fractions

Perhaps the soundest advice that can be given in connexion with the teaching of decimal fractions is: make sure that the full significance of the decimal point is appreciated before the work in multiplication and division of " decimals ", as they are usually termed, is undertaken.

The work should commence with a thorough revision of facts concerning notation. Ample time should therefore be devoted to exercises such as the following:

(*a*) Powers of 10:

$10 = 10^1$; $100 = 10 \times 10 = 10^2$; $1000 = 10 \times 10 \times 10 = 10^3$; and so on.

(*b*) Writing numbers in extended form:

$$\begin{aligned} 365 &= 3 \times 10^2 + 6 \times 10 + 5 \\ 51{,}279 &= 5 \times 10^4 + 1 \times 10^3 + 2 \times 10^2 + 7 \times 10 + 9 \\ 1{,}000{,}000 &= 10^6 \\ 6{,}532{,}429 &= 6 \times 10^6 + 5 \times 10^5 + 3 \times 10^4 + 2 \times 10^3 + 4 \times 10^2 + 2 \times 10 + 9. \end{aligned}$$

N.B.—There should be no difficulty in getting boys to use indices. There is nothing to be explained. They are simply told that $10^2$ is the "shorthand" or symbolic way of writing 100, $10^3$ the "shorthand" or symbolic way of writing 1000. They will be better pleased if they are told they are using the mathematician's way of writing such numbers.

(*c*) Analysis of the working of a multiplication sum, e.g. $1063 \times 248$.

$$\begin{array}{r} 1063 \\ \underline{248} \\ 2126\phantom{00} \\ 4252\phantom{0} \\ \underline{8504} \\ 263{,}624 \end{array}$$

Before the analysis commences some preliminary work on examples such as the following will be necessary:

$$\begin{aligned} 100 \times 10 &= 1000 \text{ or } 10^2 \times 10^1 = 10^3 \\ 1000 \times 100 &= 100{,}000 \text{ or } 10^3 \times 10^2 = 10^5 \end{aligned}$$

and so on.

The analysis will proceed as follows: (i) Before working. Approximately what is the answer?

$$1000 \times 2 \times 100 = 10^3 \times 2 \times 10^2 = 2 \times 10^5.$$

The answer is two hundred thousand and " something ". (ii) What is the 6 in the first line of the product?

$$3 \times 200 = 600.$$

What is the value of the 4 in the second line? and so on.

It will be recognized that work of the character indicated above will lay the foundation for a clear understanding of " decimals ", inasmuch as the pupil will see that the whole notation is a decimal notation. The figures to the left of the decimal point are as much " decimals " as the figures to the right. No mention of decimal point, however, is yet necessary, though the use of the other punctuation mark, the comma, should be emphasized; it assists in making the reading of numbers an easier process. The decimal point when it is introduced may be referred to as another number-punctuation mark—" the full-stop " to the whole numbers.

The next step should include preliminary work in the metric system. The metre, decimetre, centimetre, and millimetre should be studied and easy examples in addition, subtraction, multiplication, and division dealt with. Careful contrast with our own system of measuring length should be made with a view to emphasizing the decimal notation of the one and in consequence the simplicity of " carrying ", and the varying notation of the other with its difficulties of conversion from inches to feet, feet to yards, &c., before the " carrying " can be done.

**The Decimal Point.**—Having secured that the pupil has thoroughly grasped the decimal nature of our ordinary system of notation, the decimal fraction and the decimal point can now be introduced as follows. Study the number 6666.

$$6666 = 6 \times 10^3 + 6 \times 10^2 + 6 \times 10 + 6 \times 1.$$

The attention is directed to the fact that each figure is $\frac{1}{10}$ that of the figure to its left. Other examples of a similar type are studied in the same way, the attention in each case being directed to the descending order of the figures.

There should now be no difficulty in introducing the pupil to the extension to decimal fractions. In the above example, for instance, the pupil is asked: What will be the value of another 6 placed to the right of the existing number, that number remaining unchanged? He is then told that a dot, or full stop, is used to indicate that the figure to its left is the unit figure, and the commas can then be inserted. Exercises now follow in reading examples such as the following:

$$27{\cdot}23 = 2 \times 10 + 7 \times 1 + 2 \times \tfrac{1}{10} + 3 \times \tfrac{1}{100}.$$

Ample drill should be given at this stage in examples of this kind and the converse, viz. writing down numbers as punctuated figures. As already stated, the teacher should be in no hurry to introduce multiplication and division of decimals. Thorough familiarity with decimal notation and decimal fractions should be secured before any work in these two rules is attempted. Most of the difficulty which arises in the mind of the pupil regarding the decimal point is due to the fact that its place in the notation system is not sufficiently understood.

Further work should now follow on the metric system of measuring lengths. The decimetre is $\frac{1}{10}$ and the centimetre $\frac{1}{100}$ of the metre. Hence

2·35 metres = 2 metres, 3 decimetres, 5 centimetres; ·05 metres = 5 centimetres; and so on. Examples in addition and subtraction in the metric system can now be given as examples in addition and subtraction of decimals.

Work on the special decimal fractions should now follow.

$$\cdot 5 = \tfrac{1}{2},\ \cdot 05 = \tfrac{1}{20},\ \cdot 25 = \tfrac{1}{4},\ \cdot 025 = \tfrac{1}{40},\ \cdot 125 = \tfrac{1}{8}.$$

With the more intelligent pupils, exercises on decimalization of money might follow.

**Multiplication and Division.**—The pupil's greatest difficulties will arise from the variety of the methods which may be taught in the junior and senior schools, and in the mathematics and science classes. By some the old-fashioned method is abandoned in favour of " standard form " because the latter is the best for " contracted " methods. But who wants to do work by contracted methods when the work can be done more accurately and more expeditiously by logarithms and the slide rule? Others, convinced that the pupil must always be ready to explain the reasons for the working he employs, and must never use methods which tend to become mechanical and automatic, insists on the pupil arriving at the decimal point by first principles in all cases.

Apart from the fact that it is largely a ready-made and memorized explanation which the pupil gives, why should he be required to give any explanation at all? If he understood what he was doing when he first used the method, surely in the interests of accuracy and speed the sooner the work becomes automatic the better. After teaching all three methods for varying periods during the past twenty-five years, the writer is convinced that the old-fashioned method of finding the decimal point is to be preferred. The method is a sure, straightforward one which develops naturally out of the previous work on decimal and vulgar fractions, is easily understood by young pupils, who quickly become proficient in its use and thereby gain confidence in themselves. If explanation of the rules adopted is required it can quickly be recalled. The rule for multiplication is arrived at as follows:

$$\cdot 3 \times \cdot 2 = \frac{3}{10} \times \frac{2}{10} = \frac{6}{100} = \cdot 06$$

$$\cdot 03 \times \cdot 2 = \frac{3}{100} \times \frac{2}{10} = \frac{6}{1000} = \cdot 006$$

$$\cdot 03 \times \cdot 02 = \frac{3}{100} \times \frac{2}{100} = \frac{6}{10{,}000} = \cdot 0006,$$

and so on.

The pupil observes that there are as many decimal places in the answer as there are noughts in the denominators of the corresponding vulgar fractions, a fact known previously, of course, and that there will always be as many noughts in the denominator of this vulgar fraction as there are decimal places in the two fractions together.

Hence the rule: *Multiply as in ordinary multiplication. The total of the number of decimal places in the factors of the product is the number of decimal places in the product.* The work should be set out as follows:

Example: $75{\cdot}12 \times {\cdot}024$.

Approximate answer (the following work is done mentally):

$$75 \times 2 = 150, \; 75 \times 3 = 225.$$

Therefore $\quad 75 \times {\cdot}02 = 1{\cdot}5$ and $75 \times {\cdot}03 = 2{\cdot}25$.

The answer therefore is between $1{\cdot}5$ and $2{\cdot}25$.[1] In this particular case the approximate answer might be obtained as follows: $\cdot 24$ is nearly $\frac{1}{4}$, therefore $\cdot 024$ is nearly $\frac{1}{40}$. Hence $75 \times {\cdot}024$ is approximately $1{\cdot}8$.

The actual working is as follows:

$$\begin{array}{r} 7512 \\ 24 \\ \hline 15024 \\ 30048 \\ \hline 180288 \\ \hline \end{array}$$

There being a total of five decimal places in the two factors of the product there must be five decimal places in the answer.

Answer. $1{\cdot}80288$

The rule for division is arrived at as follows:

$$4{\cdot}72 \div 2 = 2{\cdot}36$$
$$\cdot 472 \div 2 = \cdot 236$$
$$\cdot 0472 \div 2 = \cdot 0236.$$

Further examples of a similar kind where the divisor is a whole number convince the pupil that there is no difficulty in the division of decimal fractions.

Now take an example such as $4{\cdot}72 \div {\cdot}02$. The answer can of course be deduced from the first of the above.

If $4{\cdot}72 \div 2 = 2{\cdot}36$, then when divided by a quantity which is $\frac{1}{100}$ of the former divisor the answer must be $100$ times the former answer, i.e.

$$4{\cdot}72 \div {\cdot}02 = 236.$$

But normally we shall not have the answer to multiply thus by $100$. We can instead multiply the dividend. In other words we multiply both divisor and dividend by such a multiple of ten as will convert the latter into a whole number.

Another method or a supplementary method of arriving at the same rule is as follows:

$$\begin{aligned}(4{\cdot}72 \div 0{\cdot}02) &= \frac{4{\cdot}72}{0{\cdot}02} = \frac{4{\cdot}72}{\cdot 02} \times \frac{100}{100} \\ &= \frac{472}{2} \\ &= 236.\end{aligned}$$

[1] It is a good plan to insist on getting an approximate answer, not only as a check on the work, but as forming a habit likely to be useful when work is done by logs or the slide rule.

RULE: *If the divisor is not a whole number, move decimal point a sufficient number of places to the right to convert it into a whole number and move the decimal point in the dividend the same number of places*, i.e. multiply both by such a multiple of ten as will convert the divisor into a whole number. Proceed as in ordinary division.

Some teachers prefer the " standard form " method, i.e. multiplying divisor and dividend by such a multiple of ten as will convert the former into a quantity consisting of a whole number of one digit followed by decimal places. For example: $42{\cdot}635 \div 0{\cdot}0258$ becomes $4263{\cdot}5 \div 2{\cdot}58$. By this method the pupil has to accustom himself to division by a divisor which is partly a whole number and partly a decimal fraction. For pupils who experience no difficulty in dealing with such a divisor, this method has obvious advantages. Other pupils, however, accustomed to division by 258, find division by 2·58 confusing. The presence of the decimal point " worries " them, even though in practice they concentrate on the 2, or rather for the time being ignore the 58, each time they have to find a quotient figure.

## Proportion

In proportion the unitary method should not be adhered to too long. Examples such as the following can be worked mentally and do not need the unitary method.

(i) If I walk 15 miles in 5 hours, how long will it take me at the same rate to walk (*a*) 48 miles, (*b*) 8 miles?

(ii) If the wages of 3 men amount to £12, 18s. per week, what will be the total wages of (*a*) 6 men for 2 weeks, (*b*) 9 men for half a week.

Such work easily leads up to the solution of examples in proportion as follows.

*Example.*—If the cartage costs on 30 tons of goods carried a distance of 115 miles is £85, what will be the cost of cartage on 69 tons carried a distance of 80 miles.

The cost on 30 tons carried 115 miles is £85.
The cost on 69 tons carried 80 miles is £$x$.

$$x = £\overset{17}{\cancel{85}} \times \frac{\overset{3}{\cancel{69}}}{\underset{10}{\cancel{30}}} \times \frac{\overset{8}{\cancel{80}}}{\underset{23}{\cancel{115}}}$$

$$= £136. \text{ Answer.}$$

The multiplying ratios are obtained as follows. In the second case 69 tons have to be carried as against 30 tons in the first instance. The cost will be more being in the ratio of $\frac{69}{30}$. Again the distance is less and the cost will be less being in the ratio of $\frac{80}{115}$.

## Percentages

As much use as possible should be made of the fact that a *percentage is a fraction whose denominator is* 100, $5\% = \frac{5}{100}$. " Interest at the rate of 5% per annum " means that the borrower has to pay to the lender each year $\frac{5}{100}$ of the money as rent for the use of that money.

*Example.*—The national capital before the war was estimated at £15,019 millions. Transport, industries, &c., absorbed £3753 millions and agriculture £876 millions. What percentage did each form of the whole?

1. Fraction of national capital represented by transport, &c.,

$$= \frac{£3753}{£15019}$$

$$= \frac{3753}{15019} \times 100\%$$

$$= 25\% \text{ approx.}$$

2. Fraction of national capital represented by agriculture

$$= \frac{876}{15019} \times 100\%$$

$$= 5{\cdot}8\%.$$

## Business Arithmetic

The various applications of percentages constitute to a very large degree what is termed the arithmetic of the business world. Discount, profit and loss, commission, simple and compound interest, discount and bills of exchange, stocks and shares, usually form the bulk of this section of the arithmetic syllabus. The work at this stage will lose most of its value if the pupil does not begin to feel that his arithmetic is bringing him into contact with the world outside school, the world of business and home affairs as viewed by the ordinary citizen. The problems should be genuine applications to the affairs of the real world. For this reason compound interest should certainly be extended to house purchase and mortgage interest, bank loans, insurance and annuities, saving and deposit accounts, and an explanation of stocks and shares given which will make them more than mere arithmetical examples.

Little need be said as to " method " of this applied arithmetic. As already stated, the actual arithmetic consists very largely of the application of percentages, and the " fraction " definition simplifies most of the work. In simple interest, for example, formulæ are unnecessary.

*Example.*—Find the simple interest on £535 at 6% for 7 years.

$$\text{The simple interest per annum} = \frac{6}{100} \times £535.$$

$$\text{The simple interest for 7 years} = 7 \times \frac{6}{100} \times £535$$

$$= £224,\ 14\text{s. } 0\text{d.}$$

Little time should be spent on examples usually included in textbooks on finding time and rate per cent, since these have little practical value.

The usual textbook examples of finding compound interest for a few years only should not be allowed to exhaust the subject. The practical application of compound interest to insurance, mortgage loans, and so on, necessitates the use of: (*a*) compound interest tables; (*b*) compound interest formulæ and the use of logarithms. The necessity for the use of logarithms of more than four figures in order to give a satisfactory degree of accuracy in certain examples will of course be appreciated, but the compilation of compound interest tables will be the better understood if a few examples at least are worked by logarithms.

## Conclusion

In confining this section of *The Teachers' Guide* entirely to arithmetic it has been possible to emphasize the importance of the fundamental work and the value of acquiring speed and accuracy in the application of the fundamental arithmetical processes. The treatment of the mathematical extensions of the subject is dealt with in the following section, the two sections combined aiming at " developing in the pupil an appreciation of the meaning and teaching of a coherent system of mathematical ideas ".

# ELEMENTARY MATHEMATICS

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# ELEMENTARY MATHEMATICS

## CHAPTER I

## Arithmetic and Elementary Mathematics

In the preceding section on Arithmetic, it has been made abundantly clear that although in this work one section is devoted to arithmetic and another to elementary mathematics, no such complete isolation of arithmetic from elementary mathematics in the school course is for one moment intended. Of all the reforms that have been brought about in mathematical teaching during the past twenty-five years, one of the most important and far-reaching has been the unification of all branches of mathematical science and art. The reform has aptly and justly been described as " the arithmetization of geometry and the geometrization of arithmetic by the intermediacy of generalized arithmetic and of algebra ".[1] Although therefore this present section is devoted to the teaching of elementary mathematics it is to be regarded as entirely complementary to the preceding section.

The term " elementary mathematics " here used is to be understood to refer to the mathematics which can normally be undertaken by pupils in a four years' course commencing at the age of eleven. This of course does not mean that the mathematical syllabus for pupils up to the age of eleven is to be confined entirely to arithmetic. On the contrary, the process of generalization will commence as soon as the pupil feels the necessity for or the advantage of passing from the figure symbol to the general symbol. Mensuration will begin the process of " geometrizing " the arithmetic, and such generalized arithmetic as the formulæ developed from mensuration will form the introduction to algebra. In the main, however, this section covers a four years' course in geometry, algebra, and trigonometry. Mathematical education and not examination requirements has been kept in mind. The free development of the post-primary school will not, it is hoped, be hampered by the imposition of a compulsory school leaving examination. The mathematical masters and mistresses in such schools will therefore be in the very enviable position of being quite free to give due attention to the cultural value of the subject.

[1] Benchara Branfort in *A Study of Mathematical Education.*

**Development of Numerical Symbolism**

Historically arithmetic has developed gradually and continuously, first from mental arithmetic to written or symbolic arithmetic, then into generalized arithmetic, passing into symbolic algebra or algebra proper. Whilst this process has been developing slowly through the ages, generalized arithmetic first, and at a later stage algebra have been closely associated with the measurement of space, which study in due course developed into geometry and trigonometry. The development of the race from the period when the individual's only record of the number of sheep he possessed was the very possession of the sheep, to the period when the number was recorded by a number of things, such as a pile of stones representing the sheep, marks the first step—an enormous one—in symbolic representation. As man developed in experience and in intelligence so he developed his symbolization. He symbolized a group of objects by a single object in order to simplify his process of counting. That is, from the stage of representing objects by other objects man passed to the stage of representing a group of objects, say 10, by one object, i.e. by a compound unit. From this stage he passed in the course of years to the stage of written numerical symbols, pictures, and other signs. Thus a picture of a man holding up his hands in astonishment was the Egyptian symbol for 1,000,000. Then came the wonderful discovery that instead of having innumerable symbols to represent numbers the relative position of the symbols could be utilized to indicate different values, thus making it possible to represent any number by the use of only nine such symbols. So the abacus was invented. The graphical abacus or place value of written symbols followed, and the process thus started developed finally into the present highly complex abstract system of symbols.

Such a brief sketch of the development of numerical symbolism conveys but a poor idea of the enormous strides in man's intellectual development which each stage really represents, but it is sufficient to show how important it is that the teacher of mathematics should appreciate the fact that the step from arithmetic to highly symbolical algebra and other branches of elementary mathematics is not one that can be taken suddenly. Not only will an acquaintance with the history of the development of mathematics through the ages from the mathematical empiricism of the Egyptians to the scholarly and scientific investigations of the Greeks give an insight into the development of the mind of the pupil, but it will guide the teacher in solving problems of method and the syllabus. He will not, for instance, be making the blunder of attempting to teach highly symbolic algebra before ample preparation for such has been made by way of a preliminary training in generalized arithmetic, neither will he attempt to teach "textbook mechanics" but will see to it that such highly abstract mathematics is approached through practical experience and experiment. Neither will he in the early stages of so-called practical geometry keep the pupils at rule-of-thumb use of mathematical instruments and at work which

demands very little thought or reasoning. On the contrary, he will be keenly alive to the necessity of ensuring that the development of intellect is not arrested through want of a judicious blending of thought process and sense experience.

Teaching methods then must be based on a wise understanding of the spirit and order of the historical development of mathematics. On the one hand, young pupils must not be expected to possess the reasoning powers necessary to understand the principles underlying a highly developed science. On the other hand, their intellectual growth must not be arrested by confining the activities of the pupils to so-called practical work requiring little or nothing in the way of thought processes. Mathematical education should ensure the development of the individual both as a " doer and a thinker ".

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CHAPTER II

# The Non-selective Post-primary School Course

In the Hadow Report the following is suggested as a suitable four years' course of mathematics in a non-selective central or senior school.

Numbers. Growth of the number system.
Elementary operations with the usual applications.
The meaning of a fraction. Simple operations with fractions.
Decimals.
The measurement of length, area, volume, weight, capacity, and time with appropriate tables.
The metric system.
Areas of rectangles, squares, triangles, surface of prisms, &c.
Appropriate geometrical work.
Volumes of prisms.
Generalization of results in above work on areas, &c. Introduction of symbols, construction of elementary formulæ. Use and manipulation of formulæ. Easy equations. Transformations of formulæ for purposes of computations.
Easy factors.
Use of squared paper. Construction, meaning, and use of graphs. Drawing to scale.
Meaning and use of averages.
Factors: common factors; H.C.F. and L.C.M.
Simple algebraic examples.
Further work on fractions.
Decimalization of money. Calculation of cost.
Ratio: constant ratios. Ratios connected with angles. Sine, cosine, and tangent of an angle.
The right-angled triangle.
Surveying problems and their practical application.
Proportional division. Similar triangles.
Mensuration of the circle, cylinder, pyramid, cone, and sphere with appropriate geometry.
Percentages with applications to interest, insurances, &c. Compound interest.
Indices, logarithms.
Investments. Foreign currencies and methods of exchange.
True discount and present worth.

**Basic Principles.**—The principles on which this suggested course of work is based are as follows:

1. Arithmetic should not be regarded, as it has been and frequently still is regarded, solely as a bread-and-butter subject.
2. The amount of arithmetical knowledge indispensable for providing the necessary facility and accuracy in arithmetical work required by the pupil in his after-school life is comparatively small.
3. Instead of justifying the time usually devoted to the subject by adding to this comparatively small amount of necessary arithmetical knowledge matter which is " often without meaning to the child and is seldom of value to him in after life, attention should be devoted to giving pupils a wider mathematical training ".
4. The modern industrial system and the part played by science in the modern civilized community make greater demands upon the mathematical knowledge of the ordinary citizen.
5. Civic, national, and even international finance are now closely associated with our daily existence, and demand for their intelligent comprehension an increasing amount of mathematical knowledge.
6. This wider mathematical training which modern life demands for intelligent citizenship necessitates the replacement of much of the traditionary arithmetic of the schools by suitable parts of mensuration, algebra, geometry, and trigonometry.
7. The introduction of this new material necessitates a modification of the methods of treatment: the " mechanical, lifeless and abstract treatment of arithmetic giving place to more vivid, more logical, and more practical methods in teaching the subject—methods which will cause the pupil to appreciate both the beauty of mathematical truths and their practical applications ".
8. " *On the one hand are the abstract relations which these mathematical truths have between themselves, and on the other are relations to realities outside themselves. The history of mathematical progress is a record of the development of these two aspects of mathematical truths in close association with each other, and the view that they exist as distinct forms of intellectual activity has exerted a harmful influence upon mathematical teaching.*"
9. Every course should aim at developing in the pupil an appreciation (i) of the meaning and teaching of a coherent system of mathematical ideas, and (ii) of the importance of the subject as an instrument of scientific, industrial, and social progress

This Hadow syllabus is, as already stated, only a suggested syllabus and somewhat limited in its range, as it is only intended to provide a course suitable for a non-selective type of school in an urban area. It is instructive, however, to note that a syllabus of such modest pretensions, designed for a restricted purpose, is nevertheless based on the principles mentioned above. Thus the first part of the syllabus covers almost all

the work in fundamental arithmetic indispensable for the wider application of the subject to the world of affairs.

This wider mathematical training is directed to the study of problems which in their application bear a close relationship to problems of every-day life. This, of course, is but a syllabus and as such deals with the material of the mathematical course. The method of treatment will determine to what extent the pupil will realize that mathematics is not just a bread-and-butter subject but an instrument which, if properly appreciated, will enable him to take a more intelligent interest in and to understand more clearly problems of " scientific, industrial, and social progress ". At the same time the syllabus ensures that mathematics is treated as a coherent whole. There are no watertight compartments. It is very important to note that the syllabus, however, contains more geometry than algebra. Here again it is following very closely the historical development of the subject, and the teacher will be well advised to make a special note of the fact that in this syllabus algebra is definitely recognized as being a highly abstract branch of mathematics. There is indeed a complete absence of academic algebraic work. Algebra is introduced as a natural development of the work in elementary mensuration leading to the establishment of formulæ. The growing complexity of the work creates the necessity for a knowledge of what may be termed formula-manipulation, and thus the pupil passes on to the solution of equations, factorization, and other simple operations.

In the same way the geometry is closely associated with the work in arithmetic and more particularly in mensuration. It is largely experimental geometry, the only formal deductive work being that which arises from this experimental geometry. Such deductive work is of course important inasmuch as it prevents the subject becoming purely mechanical work in geometrical exercises. The work is practical and provides the concrete material for abstract reasoning.

Opinions may differ regarding details such as the somewhat delayed treatment of indices and logarithms, the inclusion of true discount and present worth, and the somewhat meagre amount of solid geometry—yet it is essentially a syllabus which follows the historical development of the subject, is suited to the age and mentality of the pupils, and ensures that their mathematical work, on the one hand, bears some relation to the world outside, and at the same time secures for them the opportunity of appreciating the meaning of a " coherent system of mathematical ideas ". One feels that one would rarely, if ever, hear such questions as " What is the good of it?" " What is it for?" put by pupils following such a course.

## CHAPTER III

# The Selective Post-primary School Course

The authors of the Hadow course discussed above state that central or senior schools taking this course as a basis should make such additions, especially in algebra and geometry, as " would be required by the character of the school, its objects, and the length of the course ". We come now to consider these additions which will convert the syllabus suitable for a four years' course in elementary mathematics for pupils in the non-selective type of school into one for a four years' course for pupils, presumably of higher intellectual capacity, in the selective type of school—the central or modern school.

### Syllabus

For the first two years of the course the work must necessarily be fundamental, and therefore will differ but very little indeed from that of the syllabus discussed above. The rate of progress should, of course, be greater in these schools, and for this reason it will be possible to extend the syllabus in geometry and algebra during the third and fourth years.

If reference is made to the section on Arithmetic, it will be found that the syllabus there suggested for the four years' course in arithmetic covers in the first two years nearly all that is included in the Hadow four years' course, the third and fourth years being devoted to a revision and extension of the work of the previous two years, with special reference in the fourth year to the needs of the pupil's future career. The first-year course is very largely a course in mensuration, the other part of the syllabus being devoted to a revision of the work of the junior school. The second-year course completes the mensuration course and includes logarithms.

**Mensuration.**—Now this concentration on mensuration in the first two years of the arithmetical course provides both an interesting and most stimulating course for boys and even girls at the age of eleven to twelve. The writer's experience convinces him that, provided that such work is based largely on practical experience and does not degenerate into applying and manipulating a number of formulæ, there is something intensely appealing and satisfying in this work to pupils at this age. There is historical authority, of course, for saying that this is as it should be.

We are, moreover, on safe psychological grounds in making mensuration the prominent part of our arithmetical work once the pupils have the usual arithmetical tools at their command. In so doing we are but developing the pupils' mathematical knowledge along the same lines as such knowledge has developed according to mankind's own experience. Mathematical masters will find that the more they can take their pupils out into the fields, with home-made surveying instruments for preference, and the more the work is done in the mathematical laboratory, the keener will be

the interest shown and more vivid and real to the pupils will the subject become.

The work of measurement need not of course be confined to field work and the mensuration of solids. Much will depend upon the ability of the pupils and the type of school, but there is no reason why, preferably in the second year, work on density and specific gravity and measurement of mass, force, and velocity should not be recognized as a part of the mathematical course, transferring it if need be from the elementary science course. Most science masters who now attempt such work in the first-year science course know that it is not only uninteresting but forms a very difficult introductory science course. Its transfer to the second-year mathematics course as a part of the more advanced work in measurement would add variety to the mathematical work and would assist in further developing algebra and the use of formulæ along natural lines. It would also release time in the science course for more important work, preferably in the direction of extending the syllabus to include a course in elementary biology.

There is another reason for devoting the greater part of the arithmetic syllabus to mensuration. From the point of view of mathematical education, this is the starting-point of other branches of the subject. Algebra and geometry both develop naturally from such work. This of course is but saying again what was said above. In making mensuration the starting-point in the teaching of algebra and geometry we are but taking the pupil once again along the paths traversed by mankind in the development of mathematical knowledge. The practical inductive geometry or mensuration, largely empirical, gradually developed into the abstract geometry of the Greeks, and mathematical masters will do well to appreciate the importance to the young pupil of recognizing that the step from practical mensuration to *abstract* geometry and *abstract* algebra must be a gradual one. Only those who, having attempted to teach to young pupils abstract geometry and highly symbolic algebra along the old traditional lines, have abandoned such work in favour of practical mensuration and experimental work can appreciate how much more interesting and stimulating, how much more effective and convincing the latter can be. It is so because it is based on the pupil's own experience and is suited to his stage of intellectual development.

**The Age Factor.**—There is still one other important factor which must be taken into account when the work—and particularly the mathematical work—to be undertaken in the senior school is being determined, and that is what may be termed briefly the age factor, in some respects the most important factor of all. Pupils in such schools normally will be transferred at the age of eleven and remain at least until the age of fifteen, the most critical of the school years. That is to say, so far as elementary mathematics is concerned these pupils will commence their work just about the age, for the majority of them, of the onset of puberty and continue the study at least until the early years of adolescence. Every

experienced teacher knows that during these years there is not only evidence of physiological changes but of psychical changes. Interest in "doing" diminishes and there is, as was mentioned in the section on Arithmetic, a steady decline in accuracy of achievement which reaches its maximum at about the age of fifteen for boys and from six to twelve months earlier for girls. The observant teacher notices that in the case of boys particularly, the falling off is most marked where physical growth is most rapid, and that the smaller boys seem to suffer less mental disturbance during these critical years. The observant teacher of wide experience also knows that the violence of this mental disturbance varies very considerably for different pupils. Some recover rapidly whilst others are in a state of mental unrest for quite a considerable time. Again, it is often the boys of rapid physical growth who are well into their sixteenth year before they have recovered, whilst the smaller boys have reached the period of stability much earlier.

All this is of the utmost importance to those engaged in the work of the senior schools, whilst for the teachers of mathematics it is of considerable importance. Roughly speaking, the senior school period falls into two well-marked divisions—one covering approximately the first two years from eleven to thirteen and the other from thirteen to fifteen and later. During the earlier period the pupil is for the most part still in his childhood, though the onset of puberty begins to show itself. There is, however, little evidence either of marked physiological or psychical changes. Interest in technique, in "doing", is still dominant and there is as yet little, if any, evidence of a decline in accuracy. At about the age of thirteen, however, when the pupil is entering upon the first stages of adolescence, whilst interest in technique declines and with it the "curve of accuracy" begins to fall, other qualities appear. The pupil has for one thing reached the logical stage of his development—he begins to reason for himself, to find interest in underlying principles, to have opinions and to hold views. It is during these years that personality begins to show itself and the pupil's particular bent or talent begins to emerge.

For mathematics in particular these facts have special significance. It is evident that the mathematical curriculum for the first two years of the senior school period should be quite different from that of the later period. In the earlier period the pupil is for the most part finishing his childhood—he is still, as it were, living in the world of sense impression. At the same time, however, it must be remembered that the pupil is at the end of the period of childhood and that the change is not so sudden as it appears. He is beginning to ask "Why", and he does find an interest even in a fairly long chain of reasoning so long as the facts upon which such reasoning is based are the outcome of experience. All such considerations point again to the advisability of making mensuration an important part of the arithmetical course, and developing from this the beginnings of elementary mathematics, geometry, and algebra, and of postponing both formal geometry and purely abstract symbolic algebra.

In the later period of the senior school course, when the pupil's interest in sense impressions is declining and he enters the world of feeling and emotion, interest is now found in formal mathematical reasoning. There must be no slackening of effort—no mere taking things easily. The period is altogether too critical and is essentially the period of character formation. The decline in accuracy which now becomes evident must not be treated unsympathetically—neither must it be ignored altogether. There must be nothing in the nature of a deliberate attempt to overcome inaccuracy by forceful methods—neither must there be anything in the nature of a benevolent ignoring of the facts and condoning slackness. The highest must be exacted during this period as before, but whereas in the previous period the aim was to lay sound foundations and secure automatic mastery over fundamental facts, now we have to provide the maximum opportunities for the development of other powers. As was said above—a *difference* in curriculum must now be made and the more marked this difference is the more effective it will be. Hence once again the importance of " hastening slowly " so far as formal geometry and purely abstract algebra are concerned. The cultural value of mathematics, even in these days of improved methods, is too often destroyed for many a pupil, his interest in and his taste for the subject being killed by premature and dogmatic forcing of abstract rules. It is true that much can be done during the period of approximately eleven to thirteen to ensure an intelligent knowledge of the elementary facts of geometry and a clear understanding of the main working tools of the subject. It is also true that during the same period the necessity for and the advantage of the establishment and manipulation of formulæ can be appreciated. Some teachers would even go so far as to say that it is better to postpone elementary mathematics entirely until about the age of thirteen rather than spend the previous two years in the more formal type of work. When the pupil has reached the logical stage of his mental life, then, and only then, should he be plunged into this purely formal geometry and abstract algebra. This is not to say that during the earlier period simple types of reasoning within the capacity of the pupils should not be attempted. At no stage should there be anything in the nature of an abrupt change. Such a change at the age of thirteen, however, is less dangerous than at the age of eleven.

The most difficult problem of all is that which concerns the pupil who, as he passes from puberty to adolescence, suffers the greater amount of mental disturbance. For such, an alternative mathematical curriculum is certainly necessary. The outstanding characteristics of such pupils are their abundance of initiative and their marked social or group instincts. Not merely a change in syllabus but a change in method is necessary. Further, the work undertaken must provide the maximum outlet for individual initiative combined with ample scope for what may be termed team work. As yet such pupils have no great interest in purely formal mathematical work, though what may be termed collective reasoning as

is shown in class work, as distinct from individual reasoning, will create the keenest possible interest. It is this somewhat curious combination of initiative and team spirit that tends to single these boys out as being those of marked personality, and work amongst them calls forth all the skill and sympathy which the teacher can command. For the teacher of mathematics, work with such boys is distinctly exacting. Above all, he himself must be a team leader, and during this somewhat difficult period he must devise methods which will provide them with ample opportunities both for team work and the exercise of initiative.

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## CHAPTER IV

# First and Second Years—Early Stages

We come now to a consideration of the elementary mathematics course of the first and second years, not only of the senior selective type of school, i.e. the modern school of the Hadow Report, but of any school in which a mathematical course of at least four years' duration is a part of the normal school curriculum. Mathematical teachers will be in general agreement with the statement, "It is very desirable that the course of elementary mathematics in all types of school should be approximately the same. For the first two years of the course the work will be mainly fundamental and will not vary materially whether in a grammar school or a modern school."[1] Not only is such general agreement desirable in the interests of those pupils who at the end of the second year may be transferred from the senior to the secondary school or from the modern to the grammar school, but sufficient has been said in the preceding chapter to make it quite evident that there is both historical and psychological authority for asserting that the elementary mathematics course should be approximately the same during the first two years for all types of schools. Divergencies in the later years there must be, for rate of progress, the type of school, length of the subsequent school course, and the future careers of the pupils are all contributory factors which help to determine the nature and extent of the later mathematical course. Whatever the subsequent structure, however, the foundation must be the best and, as the best, it will be approximately the same for each type of school.

As previously stated, this fundamental course of the first and second years should develop almost entirely out of the work of measurement, i.e. the measurement of length, area, and volume, extended if possible to measurement in elementary hydrostatics, of density and specific gravity, and in elementary mechanics, force, and velocity.

[1] Hadow Report.

**Measurement of Length or Distance**

For this course the pupil will require as measuring instruments a surveyor's chain and measuring tape, some simple form of " angle meter ", as well as the usual mathematical instruments—compass, dividers, set squares, and ruler.

The work commences with problems in finding position. If playing-field accommodation permits, treasure-hunting expeditions will help to arouse enormous interest. The pupils are told, for instance, that "treasure" C has been hid 40 ft. from the corner A of the building and 50 ft. from the tree B. Find the " treasure ". The pupils devise their own methods of finding the treasure, using measured lengths of ropes for the purpose. Three or four such exercises are given and the pupils return to their room to produce drawings to scale to illustrate their work.

Exercises of the following type now follow:

(*a*) A and B are two towns 25 miles apart. Another town C is 15 miles from A and 20 miles from B. Draw a plan showing the positions of the three towns.

(*b*) Find a point Z which is 4 in. from X and 5 in. from Y, X and Y being 6 in. apart

In like manner a treasure hunt is organized for the discovery of hidden treasure, given its distances from a given line (such as the base of a wall) and a given point, or given its distances from two given lines. Variations of this problem in the form of geometrical exercises similar to those above will then follow. The preliminary " treasure hunt " ensures that the geometrical work which follows is developed out of real experience. Any such practical exercise will of course serve the purpose so long as the subsequent work in practical geometry is thereby made real, ensuring that such practical geometry is something more than merely " doing geometrical exercises ".

Incidental work on elementary facts concerning the parts of the circle used in these exercises, the arc, circumference, radius, &c., will be treated as they arise. Simple ideas of loci can also be discussed.

**Angles.**—Some of the foregoing exercises can now be used for introductory work on angles. The first problem, for instance, can be solved by using AB as a base line and by knowing the angles ABC and BAC. The usual elementary work on angles, points of compass and compass bearing, and the more fascinating examples in measurement of inaccessible distances and heights of buildings follow.

For this purpose a simple and easily constructed home-made instrument for measuring angles—an angle meter—is required and can be made as follows.

A semicircular piece of wood about 9 in. or 12 in. in diameter and about $\frac{1}{8}$ in. thick is fitted with a simple plumb line suspended from the centre and two sighting points—screw eyelets or thin nails having their heads removed will do. The semicircle is graduated as shown, the plumb

line falling over the mark 0° when the instrument is in a horizontal position. The reading indicated by the plumb line when the instrument is inclined will then give the angle of inclination (see fig. 1).

For the measurement of angles in a horizontal plane, the other side of the instrument can be graduated as an ordinary protractor and a simple form of clock-hand made to pivot on the centre of the diameter. A more elaborate but still "home-made" instrument is illustrated in fig. 2. With such an instrument, easily made in the handicraft room, quite accurate results can be obtained.

Too much time, however, must not be devoted to outside practical work. Care must be taken that the development of reasoning and imagination is not arrested by mere repetition of exercises predominating in sense

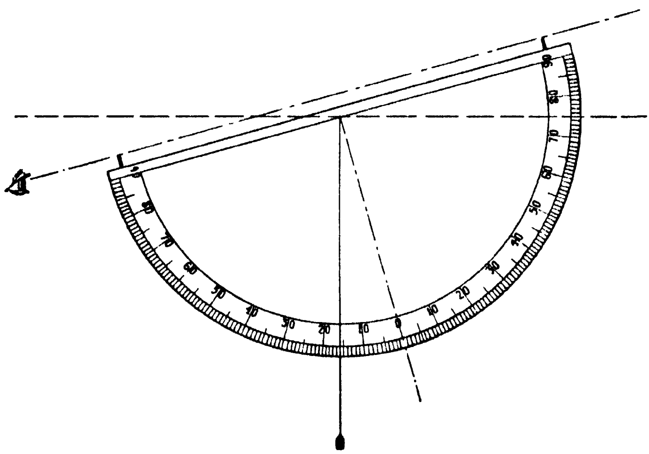

Fig. 1.—For Measuring Angles of Elevation and Depression in Vertical Plane

perceptions. It is a good plan to give pupils a few days in which to collect data in their own time. The heights and distances thus measured can then be utilized in class. In any case, however, all such practical work should be followed by exercises demanding careful thought, and by exercises which will tend to extend the body of knowledge already acquired.

The practical work mentioned above will easily lead on to the consideration of vertical, horizontal, and perpendicular lines and also to parallel lines.

Consideration of vertically opposite angles and their equality and the nature of complementary, supplementary, and adjacent angles will likewise be possible. The terms acute, obtuse, and right angles will also be dealt with, and the construction and classification of triangles, the bisection of lines and angles can be undertaken. Consideration of parallel lines will include discussions on alternate angles and the division of a line into any number of equal parts.

Nothing in the nature of formal or rigorous deductive proofs will be attempted. The aim is to give the pupils an intelligent knowledge of such elementary facts of geometry as arise naturally from their intuitions and their practical work in mensuration. The boys do not *prove* that vertically opposite angles are equal by measuring the angles with a protractor. They *know* by intuition that such angles are equal, and although they may demonstrate the fact by the rotation method, the truth for them at this stage is in the nature of a postulate.

**Definitions.**—Definitions at this stage, if used at all, and indeed at subsequent stages, should be "working definitions". Rigour of definition beyond the capacity of the pupil to assimilate must be avoided as much as rigour of deductive proof. The exactness of the definition must be appropriate to the stage of development of the pupil, and all that is demanded is that the pupil is guided to the discovery of the definition himself, and is able to apply it. There must be just that degree of refinement and precision, no more and no less, that is within the capacity of the pupil to assimilate.

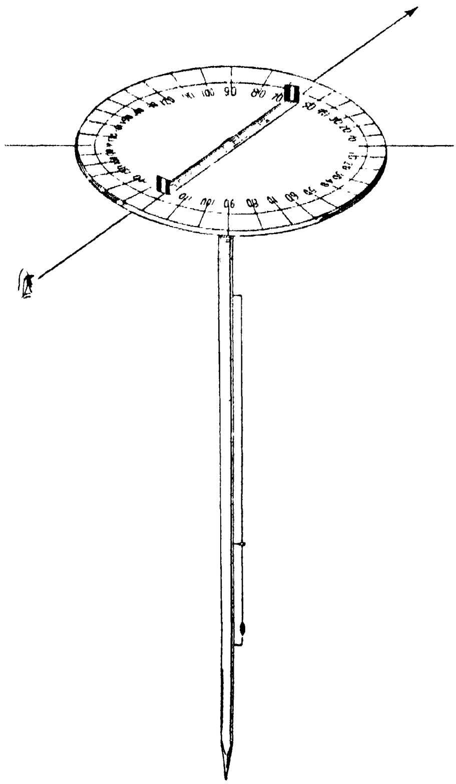

Fig. 2.—For Measuring Angles in Horizontal Plane

The work done thus far covers all that is necessary at this elementary stage in what is termed the geometry of position. The geometrical problems will have been stated, not in terms of points, lines, and angles, or geometrical exercises thereon, so much as in terms of familiar objects—trees, roads, rivers, &c. What may be termed the pupil's geometrical imagination has been stimulated by simple research suggested by the presentation of problems arising from real experience. The skilful teacher will have no difficulty in introducing the pupil quite naturally to symbolic expression. Thus in the work on the construction of triangles the introduction of the conventional capital letters A, B, and C for angles, and of $a$, $b$, and $c$ for the length of the opposite sides will be made when the pupil is ready to appreciate the advantages of such shorthand symbols. The pupil is not called upon to juggle with meaningless symbols, but is using symbols

just when he feels the real need of them, or at least can appreciate their value. His research under the guidance of the teacher, for instance, may have led to the discovery that in any triangle $A + B + C = 180°$, and that $a + b > c$, $a$ and $b$ being the lengths of any two sides of a triangle, and $c$ the length of the third. Thus even at this early stage the arithmetic, geometry, and algebra constitute one whole—" a coherent system of mathematical ideas ".

## Measurement of Area

From the measurement of length the pupil passes naturally to measurement of area, and in so doing will be studying the geometry of space and extending his use of symbolic representation.

**Rectangle.**—The first lesson at this stage will deal with the area of a rectangle. Plans are drawn to scale, say, of the school hall and the formroom, and a rough estimate of their comparative sizes is made. (Details such as recesses and fireplaces should be omitted from the plan.) Carefully chosen exercises of the following type will follow. Find by drawing to scale how many yards of linoleum 2 yd. wide will be required to cover a room measuring 12 ft. wide and 15 ft. long (only examples in which either length or breadth is a multiple of width of the covering will at this stage be given). These exercises will lead easily to the solution of the more important problem—compare the floor-space of a room measuring 12 ft. by 15 ft. with that of one measuring 20 ft. by 8 ft. From a comparison of sizes of rectangles the pupil passes easily to the problem of finding the area of a room of given length and breadth. Provided that the foregoing work has been thoroughly understood, the pupil feels the need for the rule which, under the guidance of the teacher, he now sets out to discover. In other words the pupil has not been plunged into the problem of finding a rule in which as yet he has no interest. He has been led step by step to feel the necessity for the rule. Similarly, having found the rule, he is ready to appreciate the utility of the symbolic way, $A = l \times b$, or $A = l.b$, of expressing the rule. Its application follows, and at the same time scope is found for further work in fractions, decimals, and the metric system. Some useful work in algebra in the form of manipulation of formulæ can also be undertaken. For example, $A = l.b$ is changed into $\frac{A}{b} = l$ and $\frac{A}{l} = b$.

By the use of rectangles the following algebraic expressions are illustrated and learnt:

1. $a(b + c) = ab + ac$. Thus:

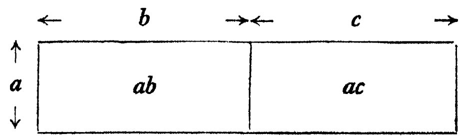


Fig. 3

Similarly $a(b + c + d) = ab + ac + ad$.

2. $(a + b)(a + b)$ or $(a + b)^2 = a^2 + 2ab + b^2$.

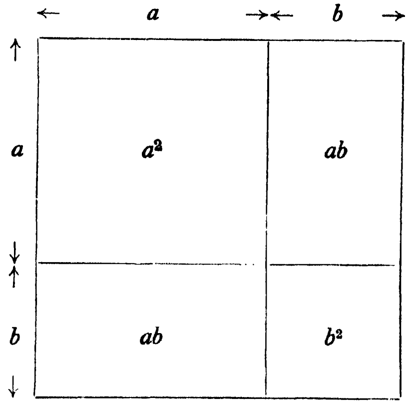


Fig. 4

3. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$.

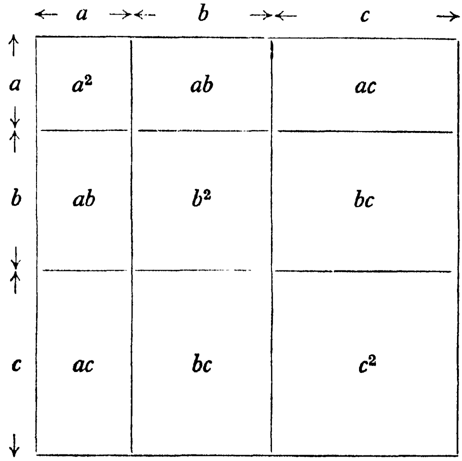


Fig. 5

4. $a^2 - b^2 = (a + b)(a - b)$.

Here the $a^2 - b^2$ is read as the difference between the squares on the lengths of $a$ and $b$, and $a - b$ as the length equal to the difference of the lengths $a$ and $b$.

It is perhaps advisable at this stage to defer consideration of the formula $(a - b)^2 = a^2 - 2ab + b^2$. The pupil is scarcely ready to appreciate the meaning of or necessity for the square of such a quantity as $(a - b)$. The

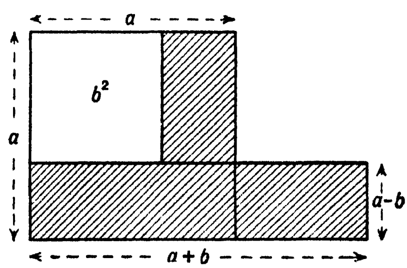


Fig. 6

formula is too abstract. In No. 4 above, the negative sign is used in the sense of "a difference between" and not as indicating a negative quantity.

5. $(x + 3)(x + 5) = x^2 + 8x + 15.$

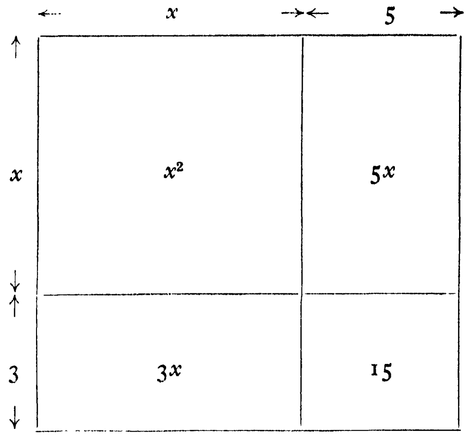


Fig. 7

These exercises will arouse keen interest at this stage and ample practice should be given in their reproduction. It will be observed that the pupil is dealing here quite early in his elementary mathematics course with the algebraical identities which appear much later in most elementary algebra textbooks. Instead, however, of being abstract algebraic expressions, they are here treated as examples in the manipulation of formulæ in mensuration. [In the section on Arithmetic it was urged that the pupil should be so familiar with his tables that whenever he received the stimulus, say 6 times 9, he should *automatically* respond 54. So with these formulæ. The pupil should be so familiar with them that he is able without the least hesitation to repeat or write down any one of them. Such familiarity means much at a later stage. Above all it ensures accuracy and confidence in working.]

**Quadrilateral and Triangle.**—Passing from the area of the rectangle, the pupil is given the larger problem of finding the area say of a quadrilateral shaped field. If the playing-field is thus shaped so much the better. If not, then the pupil is taken into the familiar world of "make-believe", and for the time being the playing-field becomes an "estate" and a portion, of convenient shape, is roped or pegged off to represent tenant Farmer Jones's field. Most textbooks suggest passing from the rectangle to the triangle, but as yet the pupil has not met the necessity for finding the area of a triangle. It is more probable that, after having dealt with the rectangle, the problem of finding the area of an irregular four-sided figure will present itself to his mind, and it is in his attempt to solve this problem that he meets with the necessity for finding the area of a triangle. Let us suppose the field is shaped as in fig. 8.

A rough sketch plan is made and the problem is presented—what measurements must be made in order to draw a correct plan of the field? The probability is that the lengths of the sides only will be first suggested, but experiment will prove that the data thus obtained are insufficient. Further discussion will suggest that the following measurements will prove sufficient: (i) Length of AB; (ii) angle BAD; (iii) angle ABC; (iv) length of AD; (v) length of BC. With the use of the home-made instruments and the tape measure, the necessary measurements for making a correct plan of the field are now obtained. Under the guidance of the teacher the pupils attempt the problem of finding other measurements which will enable them to produce a plan, this time without measuring angles. Reference is made to the sketch plan already drawn and the measurements first of AB, AD, and then the diagonal DB, and then the two remaining sides BC and DC are suggested. The pupils will readily see that this method has certain obvious advantages, as measurement of lengths can be undertaken with greater accuracy than measurement of angles. The obvious disadvantage, viz. a considerable amount of journeying, is also appreciated, and attention is now drawn to the problem of economizing effort. The pupils are told that the surveyor uses a method which overcomes both the disadvantage of measurement of angles and the waste of effort incurred in going all the way round the field. Skilful questioning will arouse interest in this new aspect of the problem. It may be necessary to give the hint that a diagonal, say DB, is used as a base line, but there should be no great difficulty in leading the pupils to discover that the measurements BX, XY, and YD, and the two offsets XC and YA, are all that are necessary.

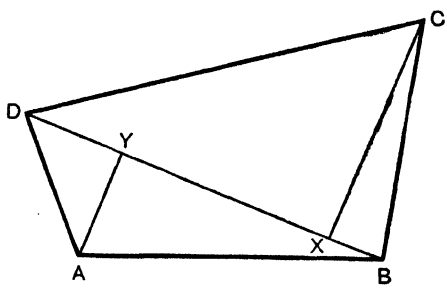

Fig. 8

The work of taking these measurements is simplified by the use of a cross staff, which can be made easily in the handicraft room. It consists of a cubicle block with two vertical slits perpendicular to each other (see fig. 9*a*), and supported on a broomstick pointed at one end. [An alternative instrument is also illustrated (see fig. 9*b*), the cross pieces being either two metal strips or wooden laths.] The instrument is used thus. It is placed as near as possible to the point X, the exact position of which is yet to be found, with one slit pointing in the direction DB. It is then moved along this base line until, looking through the slit, the point C can be seen. The point X is thus located exactly and the necessary measurements are taken. Y is similarly located and the corresponding measurements taken.

The plan is now drawn to these new measurements and the problem of finding the area is tackled. The pupils see that the problem is one of finding the area either of four right-angled triangles or of the two triangles

into which the quadrilateral is divided by the diagonal. It is at this point that the pupil meets the necessity for knowing how to find the area of a triangle. The lesson could have started—" We are going to learn how

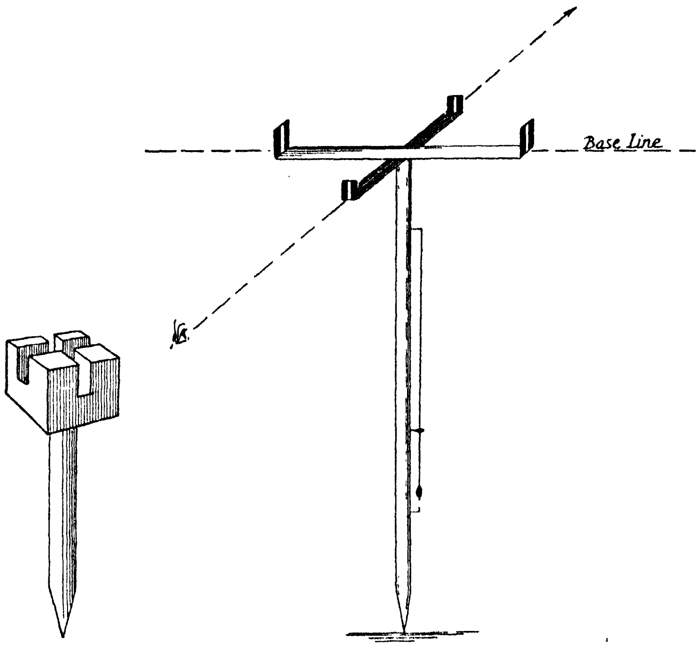


Fig. 9*a* Fig. 9*b*

to find the area of a triangle "; but there is a vast difference in teaching method between thus forcing the attention of the pupils to such a problem and arousing their interest therein by leading them to *feel the need for such knowledge*, especially when such need has arisen out of a natural development of work which they have already understood and carried through.

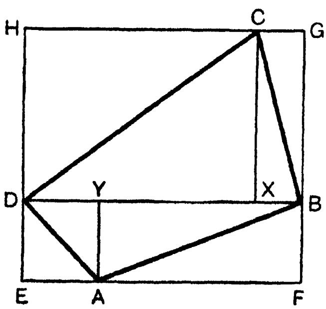


Fig. 10

At this point two methods of procedure are before the teacher. He may break off entirely from the problem in hand and guide the pupils to the solution of the general problem of finding the area of any triangle, returning to the quadrilateral and its two triangles as particular cases of the general rule thus obtained. Or he may continue with the problem in hand and proceed from the particular triangles to the solution of the general problem of finding the area of any triangle. The latter is obviously the better course. The pupils have no difficulty in seeing that the triangle ADY is half a rectangle

and the rectangle is then sketched in. The same applies to the triangle ABY, and the pupil quickly sees that the area of the triangle ABD is one-half the rectangle EFBD or half DB.AY (see fig. 10). The other triangle, BCD, is seen to be half the rectangle DBGH or half DB.CX.

In this particular case the pupils see that the area of the quadrilateral is half the area of a rectangle whose sides are respectively equal to the length of one diagonal and the sum of the offsets. In other words they have discovered the formula,

$$\begin{aligned} \text{area of quad.} &= \tfrac{1}{2}\,(\text{diagonal} \times \text{sum of offsets}) \\ &= \tfrac{1}{2}\,d(x+y). \end{aligned}$$

They have also seen that the area of each triangle was found to be half the rectangle erected on the base of the triangle and of the same height. The question presents itself: is this always true? and any triangle ABC is drawn (fig. 11), and its area investigated.

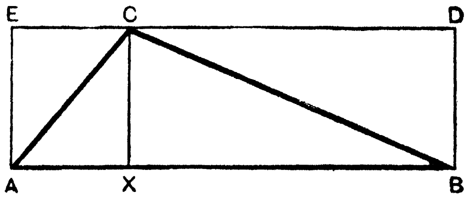

Fig. 11

$$\begin{aligned} \text{Area of triangle AXC} &= \tfrac{1}{2}\text{ rectangle AXCE.} \\ \text{,, \quad ,, \quad BXC} &= \tfrac{1}{2}\text{ \quad ,, \quad XBDC.} \\ \therefore \text{ Area of triangle ABC} &= \tfrac{1}{2}\text{ rectangle ABDE} \\ &= \tfrac{1}{2}\text{AB.BD} \\ &= \tfrac{1}{2}\text{AB.XC,} \end{aligned}$$

i.e. the area of a triangle is half the product of the length of the base and the altitude.

The case of the obtuse-angled triangle, in which a side not opposite the obtuse angle is taken as a base, should be investigated (fig. 12).

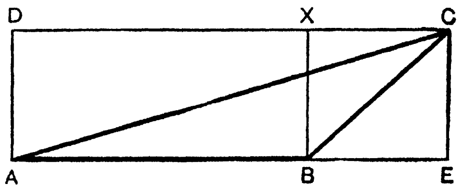

Fig. 12

$$\begin{aligned} \text{Area of triangle AEC} &= \tfrac{1}{2}\text{ rectangle AECD.} \\ \text{,, \quad ,, \quad BEC} &= \tfrac{1}{2}\text{ \quad ,, \quad BECX.} \end{aligned}$$

By subtraction:

$$\begin{aligned} \text{Area of triangle ABC} &= \tfrac{1}{2}\text{ rectangle ABXD} \\ &= \tfrac{1}{2}\text{ AB.BX} \\ &= \tfrac{1}{2}\text{ base} \times \text{altitude.} \end{aligned}$$

Ample exercises on the area of quadrilaterals and triangles will now follow, with, of course, further practice in the manipulation of formulæ. Some mathematical masters may complain that the pupil is getting "no algebra", and that by this time work in simple and simultaneous equations should have been reached. The answer is that at this stage the pupil feels no need for purely abstract algebra. That to force him to it is to run the risk of

creating a distaste for the subject by compelling him to undertake work which as yet is unintelligible to him, and would therefore become purely mechanical manipulation. He does understand the use of formulæ and his algebra for the present is confined to such work.

**Application of Formulæ.** — Application of formulæ may be extended by such exercises as the following:

1. Find a formula for the area of fig. 13. Give the formula in the form which can be applied most readily.
2. Find the area when $a = 5$ units, $b = 7$ units, and $c = 4$ units.

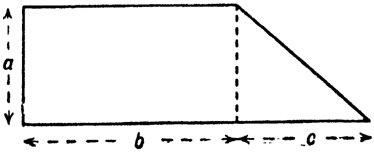


Fig. 13

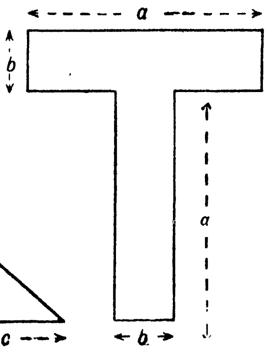


Fig. 14

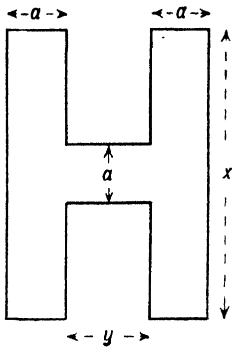


Fig. 15

3. Find a formula which will express the ratio of the areas of the two parts.
4. Find a formula for the area of figs. 14, 15, and 16.

There should be no difficulty in devising problems of this type. They can be made more complex by requiring, say, a formula for the weight of material in each, given the weight as W oz. per square unit.

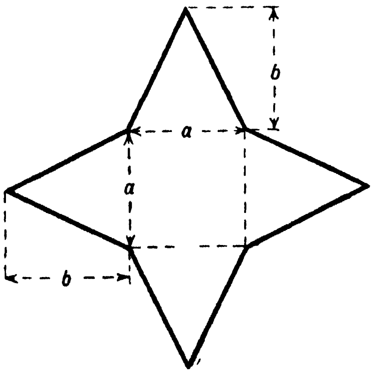


Fig. 16

The building up of a few complicated formulæ of this type will prepare the way for such exercises as the following:

1. Find the value of $\dfrac{Wa}{b(W + P)}$ when $W = 4$, $a = 8$, $b = 2$, and $P = 12$.[1]
2. The breaking weight in a beam can be calculated from the formula $W = \dfrac{KBD^2}{L}$ where W is the weight in hundredweights, B is the breadth, D is the depth, and L is the length, all in inches. Calculate the breaking weight on a cast-iron beam 12 ft. in length, 3 in. broad, $4\frac{1}{2}$ in. deep, taking $K = 46$.[1]

Further practice should also be given in the identities already learnt. As already stated the pupil cannot be too familiar with such identities as $(a + b)^2 = a^2 + 2ab + b^2$, $a^2 - b^2 = (a + b)(a - b)$. He should also be able to write down without hesitation the answers to such products as $(a + 3)^2$; $(2a + 3b)^2$; $(x + 3)(x + 5)$; $(2x + 3)(3x + 5)$.

[1] Gibbs, *Engineering Mathematics*.

Easy factorization of the following types of expressions can also be attempted as further examples in the manipulation of formulæ: (i) $ax + bx$; (ii) $a^2 + 2ab + b^2$; (iii) $a^2 - b^2$; (iv) $ax^2 + bx + c$.

The identity $a^2 + 2ab + b^2 = (a + b)^2$ can now be used as the basis of teaching square root, if this has not already been dealt with in the arithmetic course.

**Pythagoras' Theorem.**—The introduction of square root and the previous work on the right-angled triangle makes a convenient point at which to introduce Pythagoras' Theorem. The teacher has a choice of one or two methods of approach. He can set the pupils to construct carefully a right-angled triangle, given the lengths of two of the sides. The pupils are divided into half a dozen groups, each group being given different dimensions for these two sides. Careful measurement of the hypotenuse is then made by each boy, and the average length of the measurements thus taken by each individual is accepted as the length of the hypotenuse of each group's triangle. The pupils are then instructed to square the length of each of the given sides and compare the sum of these with the square of the length of the hypotenuse.

The other method of approach is to tell the pupils that Pythagoras, a Greek philosopher who lived 500 years before the Romans first came to Britain, made the wonderful discovery that the square in the hypotenuse of a right-angled triangle is equal in area to the sum of the areas of the squares on the other two sides, the pupils then being shown the demonstration of the truth of the theorem as explained below.

It should be clearly appreciated that the first method of approach is neither a proof of the theorem, nor can it be dignified by the name of geometrical research, undertaken by young pupils to discover in the course of half an hour what only a man of genius, working with a limited knowledge of mathematics and very crude instruments, discovered. The experiment in measuring the sides is a useful one, but it will fail in its object if it is regarded as anything more than a method of approach to the theorem. This point is purposely stressed. Under an enthusiastic mathematical master the pupils can catch something of the spirit of mathematical research, and an appreciation of the genius of the mathematician, if they are impressed as they should be by the importance of the discovery. The theorem should be referred to as a " wonderful discovery " as indeed it was, and the pupils should not accept it as something quite ordinary, or as an interesting fact taken for granted. In some respects the statement of the historical fact of the discovery is a more impressive method of approach or introduction than the work in measurement, as this latter method is apt to deceive the pupils that the discovery was a fairly simple matter.

The theorem having been introduced, practical demonstration of its truth will help to impress the fact on the minds of the pupils. Two modes of such demonstration are given.

1. Through the point where the diagonals of the square on the larger of the two sides about the right angle meet, one line is drawn parallel to the

hypotenuse of the triangle, and another at right angles to this line, thus dividing the square into four equal parts. These are then cut out, and if placed in the corners of the square on the hypotenuse as shown in fig. 17, it will be found that a space in the centre of the latter square can just be filled by the square on the other side about the right angle.

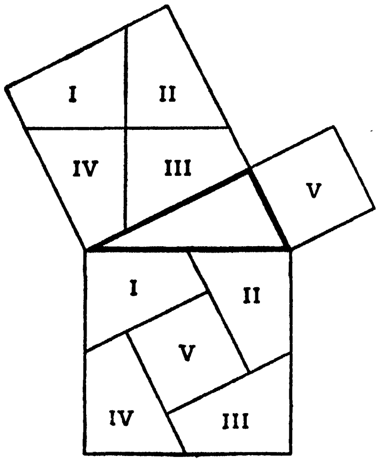


Fig. 17

2. A more ingenuous method is as follows. A figure ABCDEFG, made up of two squares ABFG and CDEF, is drawn as shown (fig. 18). This figure represents the squares on the two sides about the right angle of a right-angled triangle, and can be cut into three parts which when fitted together make a square equal in area to the square on the hypotenuse. The division is made by taking a point X in GE, such that GX = FE, and joining AX and DX. The triangles AGX, DEX are then removed and placed in position as indicated in fig. 19, so as to complete the square.

Although at this stage the formal proof is not given, the nature of the above, as demonstrations only, should be emphasized. It is a good plan to indicate to the pupils that a proof can and will be given later. The basis of this method of proof can be demonstrated by measurement as follows. A line CX, drawn from the right angle C of the triangle at right angles to the hypotenuse if produced to meet the opposite side of the square in Y, divides the largest square into two rectangles which are respectively equal in area to the other two squares. The fact can be verified by careful measurement, and the pupils are informed that later they will prove that these rectangles are always respectively equal in area to the squares on the other two sides, and hence the truth of the theorem is established. It is not impossible at this stage, even though as yet no formal geometry has been undertaken, for intelligent pupils to want to know the nature of this proof, and the teacher who has thus successfully aroused their curiosity should most certainly satisfy it. In other words, if the pupils feel the need for the proof it should be given to them.

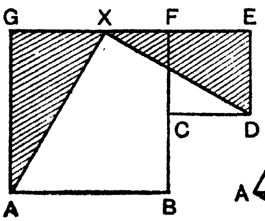


Fig. 18

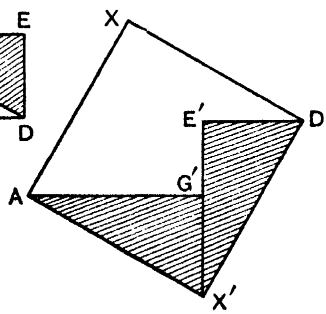


Fig. 19

The truth of this important theorem having been demonstrated, its application to finding square root by graphical methods follows, and thus the geometry is linked up again with arithmetic and algebra. The theorem, of course, can also be applied to other problems, such as finding the altitude of triangles, the height of a roof, given the slant height and span, and vice versa. There is ample scope here, limited only by the ingenuity of the teacher, for much varied and useful application of a very important theorem.

**Polygon and Trapezium.**—The practice work in algebraic identities referred to on p. 276, should be undertaken at short intervals so as to prevent anything in the nature of a prolonged interruption in the further work in mensuration. One of the most fatal mistakes in the teaching of elementary mathematics is "intellectual dawdling". "Push ahead" should be the watchword, and much of the work that has been mentioned immediately above can well be set as homework exercises whilst the main work is being further developed and extended.

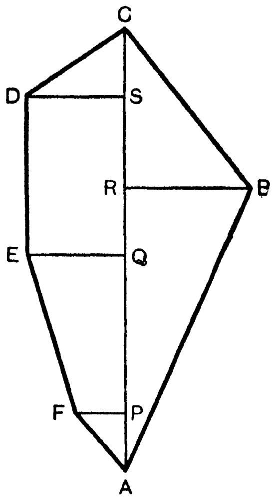

Fig. 20

The first step in such extension will be to find the area of a more irregular shaped field, such as that illustrated in fig. 20.

The pupils, who should have no difficulty in suggesting the necessary measurements, are introduced to the surveyor's "field book" method of recording the measurements in convenient form. Let us suppose that a field of some such shape as the above is near at hand or can be pegged out on the playing-field. The figures are recorded thus:

| | Yards. | |
|---|---|---|
| | To C | |
| | 250 | |
| to D 58 | 210 | |
| | 160 | 75 to B |
| to E 58 | 120 | |
| to F 35 | 30 | |
| | From A | |

The pupil here meets a new kind of quadrilateral, the trapezium FPQE, and the need for a formula for the area of such a figure is realized. The application of knowledge already obtained simplifies the solution of the problem. Thus, by drawing the diagonal EP, two triangles are obtained,

and the formula for the area of a trapezium, viz. $\frac{1}{2}$ sum of parallel sides $\times$ perpendicular distance between them, is readily obtained. The working necessary to find the area of the field is set out thus:

| | | Sq. Yd. | | Sq. Yd. |
|---|---|---|---|---|
| Area of triangle ABC | | $= \frac{1}{2}(250 \times 75)$ | = | 9375 |
| ,, | ,, APF | $= \frac{1}{2}(30 \times 35)$ | = | 525 |
| ,, | trapezium FPQE | $= \frac{1}{2}(93 \times 90)$ | = | 4185 |
| ,, | rectangle EQSD | $= (58 \times 90)$ | = | 5220 |
| ,, | triangle DSC | $= \frac{1}{2}(58 \times 40)$ | = | 1160 |
| | | Total area | = | 20,465 |
| | | | = | 4·23 ac. |

Pupils thoroughly enjoy field work of this kind, and further textbook examples should be given. In all cases a well-drawn though not a scale-

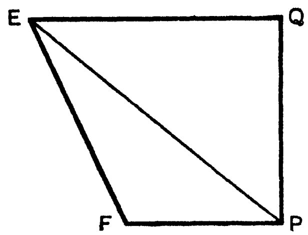

Fig. 21

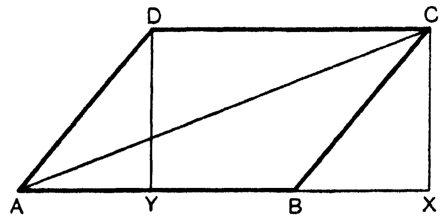

Fig. 22

drawn diagram should be produced from the field book, and the attention directed to the importance of carefully arranging the necessary working, not the least important aspect of this particular piece of work.

**Parallelogram.**—The pupil has now dealt with the areas of the rectangle and the square, the triangle, the irregular quadrilateral, and the trapezium. He is quite ready to complete the list by including the parallelogram. The ample practice he has now had in finding the area of the triangle will enable him to find without difficulty the formula for the area of the parallelogram. He is guided to deal with it thus:

In fig. 22

$$\begin{aligned}\text{area of parallelogram} &= \text{area of triangle ABC} + \text{area of triangle CDA}\\ &= \frac{AB \times CX}{2} + \frac{CD \times DY}{2}\\ &= \text{twice } \frac{AB \times CX}{2}\\ &= AB \times CX\\ &= \text{base} \times \text{height.}\end{aligned}$$

(The equality of CX and DY is obvious. By cutting out the triangle DCA, the equality of DC and AB can be demonstrated by superposition.)

The truth of this formula can of course be demonstrated by cutting out the triangle AYD and placing it in the position BXC, thus converting the parallelogram into a rectangle.

Exercises on the construction of parallelograms and their areas will now follow.

**Circle.**—The circle is such a familiar figure to the pupils that, having dealt with other familiar figures including the triangle, rectangle, square, and the parallelogram, they should, if their interest has really been aroused in the previous work, desire now to find the area of a circle.

The ratio of the diameter to the circumference must first be investigated, and in this connexion the teacher must not expect the pupils to measure to any degree of accuracy the circumference of a circle drawn on paper, even if the circle is a large one. The fetish of making every boy do his own experiment leads to a good deal of wasted time and effort, and produces very often results which are valueless and which at times unfortunately have to be " explained away ". In the science laboratory it is fortunately being recognized that whilst experimental work is excellent, such work need not always be in the nature of individual experiment. Demonstration by the science master is a most valuable part of experimental work.

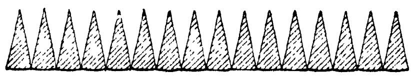

Fig. 23

So here, instead of setting pupils to measure with cotton the length of the circumference of a circle of three- or four-inch diameter, the length of the circumference of the large circular end of the cylinder from the art room is found by wrapping a strip of paper around it and measuring the distance between the two pin-points made by puncturing the paper where it just overlaps. The circumference of a circle of ten- or twelve-inch diameter can certainly be measured sufficiently accurately by this method to give the value of $\pi$ as $3{\cdot}14$. A bicycle wheel and other large circles are measured and the value of $\pi$ as $3{\cdot}14$ or $3\frac{1}{7}$ is again established.

The pupils can now be set to verify approximately this value for themselves, by means of the following experiment. Draw a circle of say one-inch or two-inch radius. Cut the circle into sixteen equal sectors after drawing the necessary diameters. Paste the sectors carefully together as in fig. 23. The bases of the sectors make approximately a continuous straight line which when measured will be found to be approximately $3\frac{1}{7}$ times the diameter of the circle. No great degree of accuracy can be expected from this experiment, but it assists the pupil to fix the formula in his mind—he readily appreciates the fact that the degree of accuracy in the result depends partly on his skill and partly on the number of small sectors taken. The experiment also serves the very useful purpose of suggesting to the pupil a method for finding the area of the circle.

It must of course be explained that the *exact* value of this ratio cannot be obtained, and for that reason the ratio is denoted by a symbol—the agreed

symbol being the Greek letter $\pi$. Hence the circumference of a circle is $\pi \times$ diameter.

The area of a circle is obtained in the following manner. Compare the area of a circle of radius $r$ with the area of the circumscribed and inscribed square (fig. 24).

The area of the circumscribed square ABCD is $2r \times 2r = 4r^2$.

$$\begin{aligned}\text{The area of the inscribed square PQRS} &= 2\left(\frac{\text{SQ} \times \text{OR}}{2}\right)\\ &= \text{SQ} \times \text{OR}\\ &= 2r \times r\\ &= 2r^2.\end{aligned}$$

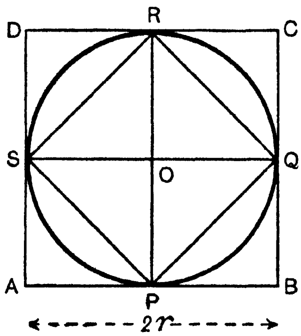

Fig. 24

The area of the circle is obviously between $2r^2$ and $4r^2$ and is approximately $3r^2$. The previous work on the value of the ratio indicated by $\pi$ may tempt the pupils to hazard a guess as to the exact area of the circle. In any case this preliminary exercise will help to make the following work more convincing.

A circle is divided into sixteen sectors as previously (see fig. 23). The sectors are now re-arranged as in fig. 25, forming approximately a rhomboid whose height is $r$, and whose base is half the circumference of the circle or $\pi r$. The area of the circle is therefore $\pi r \times r$ or $\pi r^2$.

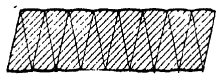
Fig. 25

The formula for the length of the circumference and the area of a circle having been established, much additional work in formulæ construction and manipulation can now be undertaken. The following are suggestive exercises:

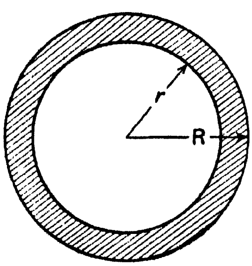

Fig. 26

1. Establish a formula for the area of the ring in fig. 26.

2. Change the formula $\pi R^2 - \pi r^2$ into a form which can be used more conveniently.

3. Find the surface area of the circular metal plate which has been drilled as in fig. 27.

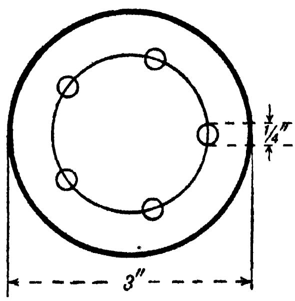

Fig. 27

4. Find a formula for the surface area of this plate of diameter 2R, when each of the small circular holes is of radius $r$.

Geometrical exercises on the construction of circles and a study of some of the more important properties of the circle can be undertaken

whilst the more practical work on the mensuration of the circle is forming a part of the mathematical course. Here again no formal proofs are attempted. The terms diameter, arc, chord, secant, and sector are made familiar to the pupil, and he can easily discover under the guidance of the teacher how to find the centre of a circle and how to circumscribe a circle about a triangle. The angle properties of a circle, the meaning of the term tangent, and the construction of tangents can also form a part of the practical geometry course.

Work on the construction and the area of some of the more important polygons follows and will complete the mensuration of the plane figures and the appropriate geometry related thereto.

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## CHAPTER V

# First and Second Years—Later Stages

From the measurement of area the natural step is to the volume of solids, and allied to this section of the course in mensuration should be a course in solid geometry. In his eagerness to hurry on to formal geometry the mathematics master is sometimes content to hand that portion of the course in mensuration which deals with the measurement of volume over to his science colleagues. The inevitable result is that whilst the practical work in the measurement of volume is done with reasonable thoroughness, the mathematics course is devoid of any solid geometry. Its omission from the preliminary elementary mathematics course not only leaves this section of the work incomplete, but leads either to its entire omission from the usual school course or, if postponed until later in the course, tends to give the impression that it is unrelated to mathematical geometry. "Its persistent neglect by teachers, examining bodies, and writers of textbooks is one of the most marked and regrettable features in the developments of recent years."[1]

It is equally regrettable that the mathematics master not only neglects solid geometry but is content to relegate it to the handicraft room. However well the handicraft master there teaches it—and most of them do—the pupil is inclined to regard the subject not as a part of his mathematical course but as something quite apart from it. The application in the handicraft course of work treated by the mathematics master would vitalize the mathematical work and stimulate further interest in it. Inasmuch as the preliminary course in mathematics here suggested is intended to cover a period of two years, there is ample time for both the mensuration of solids and some solid geometry to be included.

### Mensuration of Solids

The work in this section should commence with the construction

[1] G. St. L. Carson, *Essays on Mathematical Education*.

of the following solids: the prisms, including the triangular, rectangular, pentagonal, hexagonal, and the cylinder; the corresponding pyramids including the cone; the following polyhedra—the octahedron, the dodecahedron, and the icosahedron in addition to the tetrahedron and the

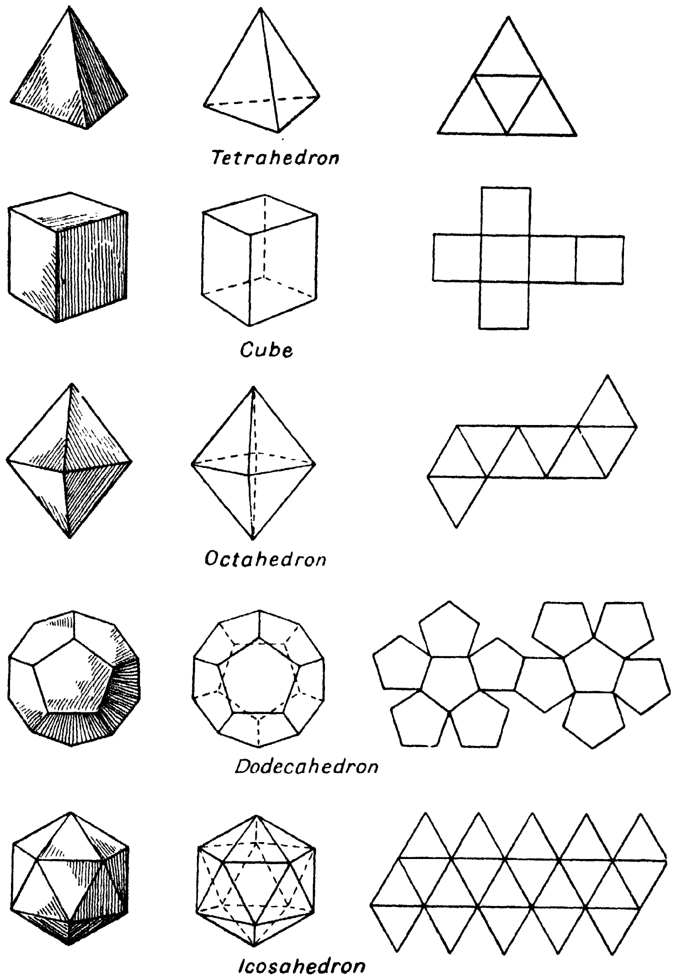


Fig. 28

cube mentioned above; and finally the sphere. These can easily be constructed out of stiff cartridge paper. The exercise is one which proves not only thoroughly interesting but one which is of immense practical value.

The theory of regular polyhedra—the fact that there must be at least three plane angles in any of the solid angles, that each of these angles

must be less than 120°, and that the faces must therefore be either equilateral triangles, squares, or pentagons—is all within the grasp of the more intelligent pupils at this stage, and the work forms an interesting link between the plane geometry already studied and the three-dimensional work now undertaken. It may, however, be advisable to postpone such work until the third or fourth year.

The "nets" required for the construction of these solids are as follows:

I. Polyhedra.—The tetrahedron, octahedron, and icosahedron are made up of equilateral triangles as follows:

1. Tetrahedron.—A large equilateral triangle whose mid points are joined, thus dividing it into four such triangles.
2. Octahedron.—A series of equilateral triangles arranged as shown.
3. Icosahedron.—Twenty equilateral triangles arranged as shown.
4. The cube.—Six squares as shown.
5. The dodecahedron.—Twelve pentagons as shown.

The simplest method is to construct the centre pentagon. With a tracing of this on tracing-paper prick off the other pentagons arranged as shown.

II. Prisms.—As examples, the hexagonal prism and the cylinder are illustrated.

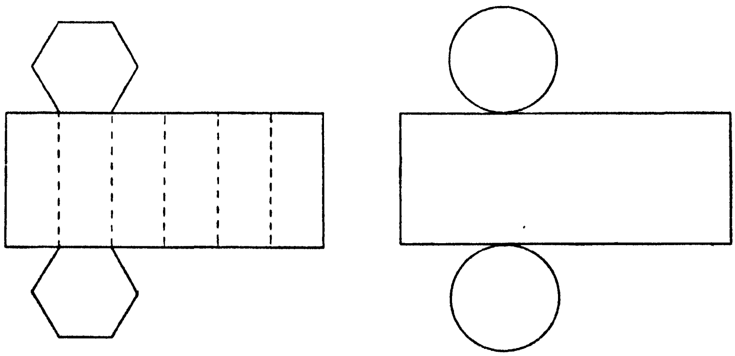

Fig. 29

III. Pyramids.—As examples, the hexagonal pyramid and cone are illustrated.

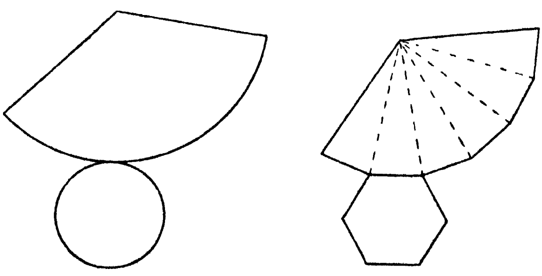

Fig. 30

To convert these nets into actual models, narrow lappets must be left on some of the edges—one to each pair of edges which meet.

Having constructed these solids and thus handled them, the pupils should tabulate details such as the number of edges, faces, and vertices. The transformation of one polyhedron from another can also be discussed and can actually be carried out. Plasticine or good yellow soap is the most suitable material, and a cube made out of these can easily be transformed into say a tetrahedron by cutting away four of the eight vertices. All this work familiarizes the pupils with the solids.

Similar work in the construction of prisms and pyramids, including the cylinder and the cone, should form a part of the same course. The construction of these being somewhat easier, some teachers may prefer to deal with them first.

Following the construction of these solids, exercises on surface areas will present no great difficulty and will form an excellent connecting link between the previous mensuration on areas of plane figures and the work on volumes which is to follow.

Practical work in the measurement of the volumes of these solids necessitates a certain amount of laboratory work in weighing and measureing. The volume of the rectangular prism and cube is of course easily obtained, particularly if a number of pupils, having made a unit cube, build up from these a rectangular prism. The formula obtained should be memorized in the form

$$\text{Volume of rectangular prism} = \text{area of base} \times \text{height},$$

rather than

$$\text{Volume of rectangular prism} = l \times b \times h.$$

The question then naturally arises—is the volume of any prism given by the same formula? Is the volume of a cylinder which is twice the height of another twice the volume? A pile of coins makes a cylinder. Is the volume of twelve pennies twice the volume of six? Displacement is suggested as the means of testing. Then arises the question—Is a cylinder whose diameter is twice that of another, twice the volume if the heights are the same? Wooden or metal cylinders of such dimensions can easily be obtained or may possibly be made in the school workshops, and the volumes of the cylinders ascertained. One is found to be four times the volume of the other, and the connexion between this fact and that concerning the area of the bases is readily appreciated.

Finally experimental work is carried out on a series of prisms—triangular, hexagonal, and so on—the volumes found by applying the supposed formula and by displacement. So the formula for the volume of any prism is established as a general statement—area of base multiplied by height.

With the aid of pyramids of the same dimensions as those of the corresponding prisms, the volume of each pyramid is found by displacement to be one-third of its corresponding prism. Hence the formula for the volume of any pyramid is established as being $\frac{1}{3}$(area of base) $\times$ height.

All such "laboratory mathematics", as already mentioned, is essentially the concern of the mathematical department of the school and should not form part of the preliminary science course. The practical work involved gives reality to the mathematics, whilst the formulæ so deduced are not only more clearly understood but arouse keen interest when used later as the basis of more abstract mathematical work.

The formula for the volume of the sphere can be obtained in much the same way as that in which the area of a circle was obtained, only the formula for the surface area of the sphere—$4\pi r^2$—will have to be accepted without proof.

The sphere is considered as being made up of a large number of small square pyramids (see fig. 31).

The volume of these pyramids will each be $\frac{1}{3}$ area of base $\times$ height, or $\frac{1}{3}$ area of base $\times$ radius of sphere. Supposing the number of such pyramids is $n$, then the volume of the sphere will be $n \times (\frac{1}{3}$ area of base $\times$ radius), which is easily seen to be $\frac{1}{3}$ surface area of sphere $\times$ radius, i.e. $\frac{4}{3}\pi r^3$.

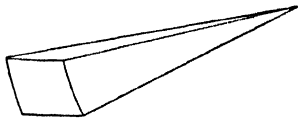

Fig. 31

**Application of Formulæ.**—The establishment of additional formulæ gives further practice in generalized arithmetic, i.e. concrete, as distinct from abstract, algebra. If work on density and specific gravity is also added to the course at this stage, the problems will have a more varied character and the mathematical study a wider significance. By this time the pupil will have become familiar with the use of indices. The quantity $r^3$ has a real meaning to him, it is $r \times r \times r$, derived from real experience. Likewise such signs $\sqrt{\ }$ and $\sqrt[3]{\ }$ have also become familiar to him, and in both cases the way has been prepared for work in indices and in surds; and what is equally important and of considerable value at this stage, the pupil's way has been prepared for an intelligent use of logarithms. The mathematical work now divides itself into three sections corresponding to the usual arithmetic, geometry, and algebra. Lessons in the mensuration of solids as indicated above will proceed along with lessons in practical solid geometry, projections, plans, and elevations, and in algebra including simple theory of indices and logarithms—the latter being in turn applied to more difficult examples in the mensuration of solids.

**Solid Geometry.**—The *practical solid geometry* course will consist mainly of exercises on orthographic and isometric projection. In the former will be included examples in drawing plans and elevations of lines in various positions relative to the H.P. and the V.P., and similar examples in drawing plans, elevations, and sections of some of the more familiar solids. In schools with a technical bias, exercises in drawing plans and elevations of simple machine parts can form part of the elementary mathematical course in order to prepare the way for the more serious study later of engineering drawing. Examples in isometric projection should be included in this section of the work.

**Logarithms**

We come finally to the treatment of logarithms. The work in formulæ manipulation and transformation has familiarized the pupils with the use of indices. They know that $r^3$ means $r \times r \times r$, and they will have little difficulty in arriving at the meaning of $a^5$, $a^7$, and in general $a^n$.

It is not unusual for work in logarithms to be postponed until quite late in the course in algebra, it being the view that considerable knowledge of indices, integral and fractional, is necessary for an understanding of logarithms. Beyond what is mentioned above regarding indices and the simple facts that, say, $a^7 \times a^3 = a^{10}$, and $a^7 \div a^3 = a^4$, which present no difficulty at this stage, very little more algebra is required before logarithms can be well understood and used with ease. The early work proceeds as follows:

The meaning of $2^2$, $2^3$, $2^4$, $2^5$; of $3^2$, $3^3$, $3^4$; $10^2$, $10^3$, $10^4$, $10^5$ is revised. Work in statistical graphs having formed part of the arithmetic course, the following exercises will present no great difficulty.

(i) Exhibit graphically 2, $2^2$, $2^3$, $2^4$, $2^5$. From the graph express 10, 18, 25 as powers of 2.

(ii) Using a larger scale, exhibit graphically 2, $2^2$, and $2^3$, and tabulate the following as powers of 2: 1·5, 2·5, 3, 3·5, 4·5, 5. [The interpolation of 1·5 will entail some discussion which should prove profitable.]

(iii) Similar exercises to (i) and (ii) with powers of 3.

These exercises will enable pupils to appreciate that it is possible to express any number as a power of 2 or as a power of 3. They will have no difficulty in arriving at the conclusion that any number can be expressed as a power of any other number.

The next step will be the consideration of numbers expressed as powers of 10. The work proceeds thus:

$$\begin{aligned} 10 &= 10^1 \\ 100 &= 10^2 \\ 1000 &= 10^3 \\ 10{,}000 &= 10^4 \\ 100{,}000 &= 10^5 \\ 1{,}000{,}000 &= 10^6 \end{aligned}$$

The next exercises take the form of asking the pupil: "What must be the first figure in the index of 42 expressed as a power of 10?" Similarly of 54 and 78 and so on; and of any number of two digits. Again, what must be the first figure in the index of, say, 226, 358, 989, 999, expressed as powers of 10? The work is continued until the rule is finally obtained that any number of two digits can be expressed as a power of ten, the index of the power commencing with 1; any number of three digits can be expressed as a power of ten, the index of the power commencing with

2; and so on. After the term logarithm has been explained (*logos*, ratio; *arithmos*, number), these statements are put into the form:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 is *characteristic* of the logarithms of all two digit numbers. | | | | | | |
| 2 | ,, | ,, | ,, | three | ,, | ,, |
| 3 | ,, | ,, | ,, | four | ,, | ,, |

A few exercises in finding the logarithm of numbers then follow. *There should, however, be as little delay as possible in getting the pupils to use logarithms.* The teacher must not forget that the main purpose in hand is the introduction to a new mathematical tool, and it is better to hurry on to the use of the logarithms as quickly as possible, returning if necessary to the underlying principle. Boys will find much more interest in the explanation of why a thing works after they have satisfied themselves that it really does work and how it works. The preliminary work detailed above should therefore not be too prolonged. As quickly as possible the pupils should be using their logarithms. At first the exercises should be quite simple, the work in the first instance being set out as follows:

Example: Use logarithms to find the product of 87 and 52.

$$\begin{aligned} 87 &= 10^{1\cdot9395} \\ 52 &= 10^{1\cdot7160} \\ \therefore 87 \times 52 &= 10^{3\cdot6555} \\ &= 4524. \end{aligned}$$

For some time the working should be set out in the above form, the numbers being expressed as powers of ten. Only when the pupils have thoroughly grasped the fundamental ideas should the base be omitted and the working arranged in the usual form. The important point at this stage is to give ample practice in the use of logarithms to enable the pupil to gain confidence in himself and his new weapon whilst understanding its nature. Exercises therefore should be simple in character in order that the working can be carried through with conviction. In the foregoing example, for instance, if the pupil has any doubt as to whether his new tool is really working he can—and it will not be surprising to find that he does—test his answer by ordinary multiplication. Once he has gained confidence in the use of logarithms in simple calculations he will use them with confidence in more complicated examples. Such examples as the following should therefore be worked:

Find the value of:

(*a*) $27\cdot5 \times 1\cdot36$; (*b*) $498 \times 2\cdot51$; (*c*) $(42\cdot5)^2$; (*d*) find the area of a circle of 2·51 cm. radius; (*e*) find the volume of a cylinder of radius 1·98 in. and 3·65 in. height; (*f*) $\dfrac{2\cdot368 \times 8\cdot951}{3\cdot682}$. It will be noticed that only numbers having positive characteristics are being dealt with at this stage.

The investigation of the use of logarithms to find square root and

cube root can be based either on a knowledge of the laws of indices, or if this is thought too difficult, the work can be based on a study of the multiples of ten.

In the latter case the pupil knows that:

$$\begin{aligned} \text{The square of } 10^1 &= 10^2 \\ 10^2 &= 10^4 \\ 10^3 &= 10^6 \end{aligned}$$

$$\begin{aligned} \text{Conversely the square root of } 10^2 &= 10^1 \\ 10^4 &= 10^2 \\ 10^6 &= 10^3 \end{aligned}$$

Similar work on cube root will establish the rule that to find square root or cube root of a number by means of logarithms the index of the power of ten, i.e. the log, is divided by 2 or 3 as the case may be.

The more intelligent boys can approach the question from general consideration of the index laws, i.e. $a^2 \times a^2 = a^{2+2}$, $\therefore \sqrt{a^4} = a^2$, and so on. Again simple examples are dealt with in the first instance, e.g. Find by logs: $\sqrt{64}$, $\sqrt[3]{125}$. The work should be set out as follows:

$$\begin{aligned} 64 &= 10^{1\cdot8062} \\ \therefore \sqrt{64} &= 10^{\frac{1\cdot8062}{2}} \\ &= 10^{0\cdot9031} = 8\cdot0. \end{aligned}$$

Further examples similar to those in multiplication and division can now be given, including such examples as: Find the radius of a sphere whose volume is 360·5 cu. in.

So far the work has been confined to numbers above unity, the characteristics of the logarithm being therefore positive. Work in negative characteristics is dealt with as follows:

$$\begin{aligned} 3658 &= 10^{3\cdot5633}. \\ 365\cdot8 &= \frac{3658}{10} = \frac{10^{3\cdot5633}}{10^1} = 10^{2\cdot5633}. \\ 36\cdot58 &= \frac{3658}{100} = \frac{10^{3\cdot5633}}{10^2} = 10^{1\cdot5633}. \\ 3\cdot658 &= \frac{3658}{1000} = \frac{10^{3\cdot5633}}{10^3} = 10^{0\cdot5633}. \end{aligned}$$

At this point attention is again called to the fact that the characteristic only is changing.

$$0\cdot3658 = \frac{3658}{10{,}000} = \frac{10^{3\cdot5633}}{10^4} = 10^{\bar{1}\cdot5633}.$$

Here it will have to be explained that in order to preserve the same decimal part the characteristic again is the only part that is changed, this being less by 1 than the previous characteristic. So with

$$0\cdot03658 = \frac{3658}{100{,}000} = \frac{10^{3\cdot5633}}{10^5} = 10^{\bar{2}\cdot5633}.$$

$$0\cdot003658 = \frac{3658}{1{,}000{,}000} = \frac{10^{3\cdot5633}}{10^6} = 10^{\bar{3}\cdot5633}.$$

The deduction is now made that if the number is less than unity, the characteristic is negative and numerically one more than the number of ciphers immediately to the right of the decimal point.

Exercises in multiplication and division by logs of such decimal fractions involves the addition and subtraction of positive and negative numbers. Pupils so far have dealt with no such problems, but this need not present any great difficulty, nor need it be made difficult. "Tell a boy about ghosts," the late Professor Perry was fond of saying, "and the simplest things become complex and mysterious. Tell a boy he is sure to find difficulty in simple algebra, and of course he finds great difficulty with a problem that would be quite easy if you told him it was easy." Is not this the case here? Need we take it for granted that the average boy is going to find difficulty in adding and subtracting positive and negative characteristics because he has not had the usual lengthy application of algebraic rules for addition and subtraction? There is no difficulty but those which the teacher is inclined to make. Put less faith in the manufacture of rules and more in the exercise of the pupil's common sense.

At the most, the pupil has to add a series of positive and negative numbers and then "subtract" a positive number from a negative number or vice versa, or "subtract" two positive or two negative numbers. To take the former. Suppose the characteristics are $2, \bar{1}, \bar{2}, 3$. Surely there is nothing but common sense needed. The sum is made in the same way as in ordinary addition, thus: 2 *and* 1 less gives 1 *and* 2 less gives minus 1, *and* 3 more gives 2.

Simple illustrations can of course be given, but the process is not so difficult as we are inclined to make it. A negative quantity is the opposite to a positive quantity. Here then a simple tug of war is going on; the centre point of the rope is two paces to the right of the mark on the ground, it is pulled back one pace, now two more, and then again to the right three paces. No rules are wanted—it's only common sense. To quote Professor Perry again: "It is only a teacher who remembers hundreds of rules."

The so-called subtraction—a word which with advantage could be abolished from mathematical language—again is straightforward common sense.

Take for example:

$$\begin{array}{r} \bar{1}\cdot1486 \\ \underline{\bar{3}\cdot8659} \\ 1\cdot2827 \end{array}$$

Following the method advocated in the section on Arithmetic, the subtraction is done by the addition, or the "cashier's", method. 9 and *seven* make 16, 6 and *two* make 8, 6 and *eight* make 14, 9 and *two* make 11. The "carried one" makes $\bar{3}$ into $\bar{2}$. The question then is, How much must be added to $\bar{2}$ to make $\bar{1}$? Again no rule is wanted, just common sense.

In the use of logarithms accuracy in working is of course of the utmost importance. The work must be arranged neatly and compactly, and each step in the process must be completed before the next is commenced. It is fatal to mix the work of determining characteristics with the reading of logarithms. *All* the numbers should be written down first, then *all* characteristics determined, then *all* the decimal parts dealt with, and so on. Unless the work proceeds thus, characteristics will be forgotten or anti-logarithms will be used instead of logarithms—errors that are all too frequently made.

An example is here worked out in full to illustrate what is meant by neat and compact arrangement:

*Example:*

$$\text{Evaluate } \sqrt{\frac{256{\cdot}5 \times 1{\cdot}326}{(0{\cdot}483)^2 \times 87{\cdot}62}}.$$

$$\begin{aligned}\text{Estimated value} &= \sqrt{\frac{250 \times 1\frac{1}{3}}{(\frac{1}{2})^2 \times 88}}\\ &= \sqrt{\frac{330}{22}}\\ &= \sqrt{15}\\ &= 4 \text{ approx.}\end{aligned}$$

$$\sqrt{\frac{256{\cdot}5 \times 1{\cdot}326}{(0{\cdot}483)^2 \times 87{\cdot}62}} = \sqrt{\frac{M}{N}}.$$

$$\begin{aligned}\log 256{\cdot}5 &= 2{\cdot}4091\\ \log 1{\cdot}326 &= 0{\cdot}1226\\ \log M &= 2{\cdot}5317\\ \log N &= 1{\cdot}3104\\ \log\frac{M}{N} &= 1{\cdot}2213\\ \tfrac{1}{2}\log\frac{M}{N} &= 0{\cdot}6107\\ \therefore \sqrt{\frac{M}{N}} &= 4{\cdot}081. \quad \textbf{Ans.}\end{aligned}
\qquad
\begin{aligned}2\log 0{\cdot}483 &= \bar{1}{\cdot}3678 \quad \bar{1}{\cdot}6839\\ \log 87{\cdot}62 &= 1{\cdot}9426\\ \log N &= 1{\cdot}3104\end{aligned}$$

The various steps in the working of the above are as follows:

1. Rough estimate. The rough preliminary estimate is of far more value than a rough check of subsequent working. Such an estimate necessitates covering rapidly the whole of the working to be done, estimates the various portions of the calculation, and gives the pupil confidence before he commences the actual working.

2. All the numbers are then written down as shown, in two columns, and the remainder of the " scaffolding " erected. That is to say every part of the working except the entry of the actual logarithms is stated. Thus the pupil concentrates on one task at a time, and incidentally has planned the working as a whole.

3. All four characteristics are then entered. (Note when a number has to be squared the characteristic is written in the margin and the necessary multiplication is done after the next step. The " blank " thus left calls attention to the necessity for such multiplication.)

4. All four logs are then completed.

5. The two additions are made, the log N is transferred, the subtraction and the division follows.

6. The anti-log is obtained and the answer compared with the rough estimate.

The work in logarithms rounds off, as it were, the preliminary two years' course in elementary mathematics. Examples such as the above can be given as practice in the use of logarithms, and of course such practice is necessary. Revision of all previous work, however, is now essential, and the use of logarithms in dealing with fairly complicated computation arising out of the application of formulæ in area, volume, density, and the manipulation and transformation of other formulæ will give new interest to the previous work in mensuration, whilst fostering appreciation of this new and valuable mathematical tool.

In the revision of the measurement of heights and distances some teachers may find it possible to introduce some elementary trigonometry and the use of sine, cosine, and tangent tables. Much will depend on the ability of the pupils, the type of school, and the nature of the subsequent mathematical work to be attempted. On the whole, work in numerical trigonometry can in most cases be postponed until the next year of the course (see Chapter VII).

## Aims of the Course

The work of this two years' preliminary course in elementary mathematics has been set out at some length. The aim of the course throughout has been to keep an even balance between the intensive practical course in mathematics and the traditional abstract mathematical course. Most modern textbooks in algebra attempt to make the early work take the form of generalized arithmetic. There is, however, something artificial about the type of exercise which takes the form of $3 \times 3 = 3^2$, $5 \times 5 = 5^2$,

$a \times a = a^2$. There is likewise something artificial about the usual early treatment of equations which takes the form of solution of problems dealing with perhaps the fact that twice A's age will be 7 years more than B's age was two years ago—or the fact that if 12 is added to twice a certain number, the result is 42.

The course in mensuration has developed naturally into the building of important formulæ, and in the transformation of these the pupil has become thoroughly accustomed to the use of literal symbols and has had considerable practice in what may be termed manipulative algebra. If this aspect of the work has been thoroughly appreciated by the mathematics teacher, and carried out naturally and with common sense by the pupil, the more academic and abstract algebra which is now to follow will have no mysteries for the pupil. His progress will be both rapid and sure, inasmuch as he has grasped the real meaning of generalized arithmetic and become familiar with and confident in the use of literal symbols.

In geometry his experience has been widened, ideas of position, shape, and size have been developed, and concepts which already existed have been systematized and extended. He has now, or should have, a sound working knowledge of the subject and a grip of the significance of its underlying truths which will enable him with confidence to use these truths in practical applications.

This confidence in the use of its underlying principles, based on the sound working knowledge secured, will give interest in and reality to the building up of the logical systematic body of knowledge termed formal geometry.

Finally, in this preliminary course of elementary mathematics such close bonds have been forged between the various branches, arithmetic, mensuration, geometry, algebra, and possibly trigonometry, in the help they have rendered one another, that to whatever extent they may now be treated as distinct branches in the subsequent course of later study, these bonds will not be weakened. A sound foundation to a "coherent system of mathematical ideas" has been laid, so much so that the pupil is in no danger of losing his sense of the unity of the subject as he proceeds to turn his attention more and more to the full development of the various branches of the subject.

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## CHAPTER VI

# Third and Fourth Years—Geometry

In the foregoing chapters the point has been emphasized that historically mathematics gradually passed from concrete experience to the study of the abstract. The point has also been emphasized that on psychological grounds mathematical education should proceed in like

manner from concrete experience gradually to the study of the abstract.

The work outlined for the first two years of the post-primary school course has been based largely on concrete experience, and mathematics has been largely analytical. We come now to the period of transition—the gradual change from this concrete and analytical mathematical work to the abstract and synthetic. At the outset it is important that the mathematical teacher should appreciate the importance of the fact that the transfer must be a gradual one. There must be no sudden break. Thus in the geometry of the third and fourth years the aim must still be to provide a broad basis of geometrical facts. The development of the subject, on rigorously Euclidean deductive lines, from first principles is not intended. Precise reasons for statements should now be insisted upon, but " young boys are never happy and are often suspicious if they feel they are being asked to prove the obvious, but they can follow a fairly long chain of reasoning ". They are suspicious because they fail to appreciate the abstract reasoning which is necessary in order that the subject may be developed from the minimum number of postulates. These obvious truths or intuitions must at this stage play a very prominent part in the development of the subject and must for the time being be accepted as postulates. To attempt to prove them is to engage in subtleties in which the pupil at this point has no interest.

The nature of these intuitions must be appreciated by the mathematical master. They are for the time being the fundamental hypotheses of the subject. They bear the same relation to mathematics as fundamental physical laws bear to physics and fundamental chemical laws bear to chemistry. Such laws or hypotheses are the starting-points from which the sciences develop. These mathematical intuitions, however, differ from scientific laws inasmuch as whilst the latter are arrived at as the result of experiment, mathematical intuitions are arrived at subconsciously. We do not know that vertically opposite angles are equal as the outcome of measurement. We are aware of the truth of the fact intuitively as the outcome of experience, because mentally we are what we are.

The fundamental facts concerning angles at a point, parallels, and congruent triangles can for the time being then be accepted as postulates, and treated as the working hypotheses of the subject. They are not accepted without proof merely to make the subject easier or more interesting. We fail to do justice to the educational value of mathematics if in our teaching methods we are for ever endeavouring to make the subject easier for the pupil. Our aim should be to adapt our methods to suit the stage of mental development of our pupils. And at the stage now under consideration the pupil is gradually passing from the period of concrete experience to the period when his interest will be more and more concerned with the abstract treatment of the subject.

Making all possible use, however, of these intuitions, straightforward proofs of theorems as well as easy riders are well within the grasp of the

pupils taking this course. The degree of precision aimed at will necessitate a proper appreciation of classification and definition. A clear understanding of the nature of such classification and of definitions constitutes in fact a most important part of the work in geometry.

**Definitions.**—Ready-made definitions, learnt parrot-fashion, must not be allowed. On the contrary, the pupils should be taught the nature of a good definition, the importance of placing the thing defined into its appropriate class, and of stating just what distinguishes it from all other members of that class. If classification and definition go hand in hand, pupils will have no difficulty in formulating their own definitions as accurately as their knowledge permits. The definitions must be learnt. Full appreciation of theorems depends to a large extent on a clear understanding and knowledge of definitions, whilst the solution of riders depends as much on knowledge of definitions as of theorems. Accuracy and precision of statement is an essential part of mathematical training. The pendulum must not swing too far in the direction opposite to that of the days of rigid Euclidean geometry. As previously stated, it is a grave mistake to assume that the change from Euclid to modern geometry has been brought about merely for the purpose of making geometry easier, and that therefore practical demonstrations can take the place of rigid proof, or vague ideas take the place of clear definitions. Modern geometry simplifies the early study of the subject. The effect of such simplification will not be necessarily easier geometry, but a more extensive course including a more systematic study of solid geometry.

**Setting out Work.**—Accuracy and precision are likewise necessary in the case of theorems and riders, and must therefore be insisted upon. Not only must the theorems themselves be stated clearly and concisely, but the pupil must be conscious of the unity of the structure of the whole body of geometrical knowledge with which he is dealing. Theorems should be presented in sequences, each group of which can be appreciated as a unit. This will have already been partly realized in the preliminary course if, as suggested, attention has been concentrated in turn on questions of position, of shape, and size. No theorem should stand isolated. Its place in the group should be recognized; its relation to previous theorems and its significance so far as subsequent theorems is concerned must be fully understood. In this manner the conception of a chain of proofs as well as a sense of logical proof will be developed, and not only will the real purpose of the study be better appreciated, but the applications of the theorems to the solution of riders will be made more intelligently and with more confidence. *Too much emphasis cannot be placed on the importance of this question of classification, definition, and appreciation of the unity of the whole body of theorems.* Only by due attention to these aspects of the study can the desired degree of precision and accuracy be secured and the subject be made to play its full part in mathematical training as well as general culture.

As regards the theorems themselves, a good standard of setting out the

whole argument must be insisted upon. In the first place good, clear, carefully drawn figures, preferably executed in pencil, are essential. Freehand drawing of circles should most certainly be discouraged. The habit should be encouraged of recalling to mind all relevant facts as the figure is being constructed. For instance, if a rider commences with the statement " P and Q are points on an arc AB of a circle whose centre is O ", the pupil almost " from force of habit " should be recalling to his mind theorems relating to angles at the circumference of a circle and so on. This can best be done if figures are well drawn. Neat conventional marking of figures, showing plainly the known or given facts, should be encouraged. The whole statement of proof must likewise be set out carefully. The particular enunciation should be stated under the headings of "*given*", and "*to prove*". Any necessary "*construction*" is briefly indicated, and the "*proof*" is then stated clearly and concisely, reasons in support of each statement being given in summarized form. The use of recognized abbreviations should, of course, be allowed, but care must be taken to see that the use of such neither impairs the precision of statements nor encourages careless, slipshod, or untidy methods of arranging written work. An example of a well-arranged proof is given below and attention is drawn to the clear indication of each part of the proof, the arrangement of the various statements made, the abbreviations used, and the manner of giving references in support of such statements. Attention is also directed to that part of the proof in which facts concerning congruent triangles are employed. The phrase " In the triangles . . ." should always be followed by the numbering of the next three lines, and the facts then entered, the equality of sides being first stated. If only one side of each triangle is known to be equal the pupil then knows that statements 2 and 3 must concern angles. If two sides are known to be equal, each to each, then the third fact must be either the third side or the included angle, except in the case of a right-angled triangle. Only by insisting on the facts concerning congruent triangles being stated in some such systematic manner will the common errors concerning congruency be avoided.

The formation of good habits in the purely mechanical work of writing out theorems should be regarded as a part of mathematical training, and attention to details must therefore be given, particularly in the early stages.

Example.—*If the square on the side of a triangle is equal to the sum of the squares on the other two sides, then the angle contained by these sides is a right angle.*

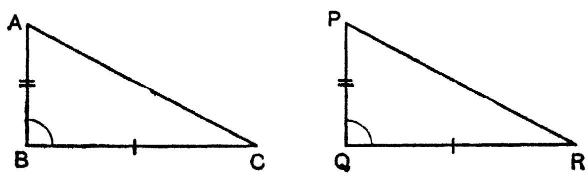


Fig. 32

*Given:* $\triangle ABC$ such that $AC^2 = AB^2 + BC^2$.
*To prove:* $\angle ABC$ is a rt. $\angle$.
*Construction:* Construct a $\triangle PQR$, so that

$$PQ = AB,$$
$$QR = BC,$$
and $\angle PQR$ is a rt. $\angle$.

*Proof:*

$$\begin{aligned} AC^2 &= AB^2 + BC^2 && (\textit{given}) \\ &= PQ^2 + QR^2 && (\textit{constr.}) \\ &= PR^2. && (\textit{Pythagoras' theorem}) \\ \therefore AC &= PR. \end{aligned}$$

In the $\triangle$s ABC and PQR

$$\begin{cases} 1.\ AB = PQ, & (\textit{constr.}) \\ 2.\ BC = QR, & (\textit{constr.}) \\ 3.\ AC = PR. & (\textit{proved}) \end{cases}$$

$$\therefore \triangle ABC = \triangle PQR \qquad (\textit{three sides})$$

so that $\angle ABC = \angle PQR$
$= \text{a rt. } \angle.$ (*constr.*)

Q.E.D.

Proofs of riders are set out in the same form—there must not be one standard for theorems and another for riders. That very valuable part of the work in connexion with the solution of riders, viz. the necessary analysis, does not of course appear on paper as a rule. The teacher therefore should give considerable attention to this in oral work. The boys who have failed to find the solution of a rider should not merely be given the solution, but should arrive at the solution by being taken through the necessary steps in the analysis. In the early stages of such work it is a good plan to insist on such analysis being given and full credit allowed for it even in the absence of a correct solution.

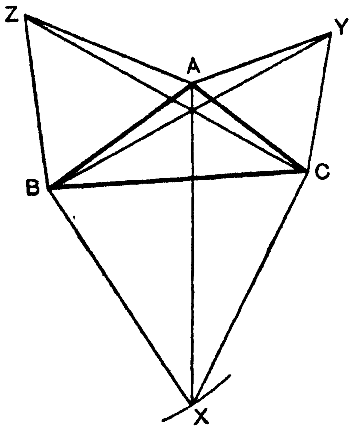

Fig. 33

Example.—*ABC is any triangle on whose sides equilateral triangles BXC, CYA, and AZB are drawn. Prove that AX = BY = CZ.*

*To prove:* (i) $AX = BY$
(ii) $AX = CZ$.

*Analysis.*—The usual method by which two lines are proved equal is the application of the congruent triangle theorems.

AX and BY are respectively sides of the triangles ACX and BCY, which *look* congruent.

(Note here the importance of well-drawn figures.)

Are they congruent?

Now in these triangles we know AC = CY and CX = BC (sides of equilateral triangles). If the triangles are congruent the included ∠ACX must be equal to the included ∠BCY. Are they? The ∠ACB is common to both ∠s. The remaining parts, ∠ACY and ∠BCX are each ∠s of equilateral triangles and are therefore equal. Hence the ∠s ACX and BCY are equal. The triangles *are* therefore congruent and it follows that AX = BY. The proof for the second part will be similar. The analysis being completed, the pupil is in a position to give proof synthetically.

A synthetic proof without previous analysis will often be found quite readily if the habit has been formed of drawing good figures, and at the same time fixing clearly in mind exactly what is given, and all that this implies, and what has to be proved. There are no sudden inspirations in solving riders. What are sometimes regarded as such may possibly be the working of the subconscious mind on the facts which the intelligent drawing of the figure suggests, and the recalling to mind all that the figure implies, all that the hypothesis grants, and all that is relevant to the conclusion to be reached.

## Syllabus

The geometry syllabus of the third- and fourth-year course here suggested is as follows:

(*a*) Fundamental ideas. Planes and perpendiculars, horizontal, vertical, and oblique lines and planes. Parallel planes and lines, solids, surfaces, lines and points. Loci.

(*b*) Direction. Angles. Parallel lines and transversals. Angles of rectilineal figures. Congruent triangles. Triangle irregularities. Construction of triangles. Parallelograms. Parallel lines and equal intercepts. Ratios. Proportional division of lines. Proportion and similarity. Construction of similar figures. Construction of quadrilaterals.

(*c*) Revision of areas and geometrical illustrations of algebraic identities. Construction of equivalent triangles. Theorem of Pythagoras and its extension. Application of Pythagoras' theorem to various constructions, square root, &c.

(*d*) Loci.

(*e*) The circle. Chord, angle, and tangent properties. Construction of circumscribed, inscribed, escribed circles and other circle problems. The common tangents to two circles.

(*f*) Solid geometry. Regular polyhedra, their construction and transformation. Lines, planes, and solids, and the projection of these in horizontal, vertical, and inclined planes. Sections of solids.

The above syllabus may be regarded by some as being more than can be attempted in a two years' course. It has been planned, however, on the sound principle that one of the surest ways of maintaining interest in geometry is to push ahead.

If the conception of a chain of proofs is to be formed in addition to the development of a sense of logical proof, we can scarcely hope to do so if too much time is devoted to any one sequence of theorems or if time

is wasted in wearisome revision of a limited examination syllabus. And if further evidence is required to prove the wisdom of the push-ahead policy, it can readily be supplied by any experienced teacher who knows the meagre success which so often attends attempts to answer simple questions on the early part of the syllabus, as compared with the large measure of success with which questions on later parts of the syllabus are attempted.

For the less academically-minded type of pupil, and particularly for the boys whose period of mental unrest following the onset of puberty referred to in Chapter III is somewhat lengthy, there is grave risk that lack of interest in the subject will arrest mental development. For such, the exploration of the unknown, even to the neglect of logic of the strictly formal kind, is the only wise course. They can return later to the more formal geometry if necessary, when for them the period of disturbance has passed and the " logical stage " in their mental life has arrived.

The syllabus can of course be varied to suit various types of school. The senior selective school with a technical bias will naturally give more time to perspective geometry and to exercises of the numerical type.

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CHAPTER VII

# Third and Fourth Years—Algebra and Numerical Trigonometry

## Algebra

If the work of the preliminary two years has been well done, the pupils, by the time they are ready to commence what perhaps may be termed algebra proper, are thoroughly at home in the use of formulæ, their construction, manipulation, and transformation. For such pupils algebra is not likely to be a " tyranny of $x$ and $y$ ". Even so, the rule during these two years should be the same as during the previous two years. That is to say, new processes should not be introduced to the pupil until he feels the necessity for such, or at least is able to appreciate them. Frequent reference to the work of the previous two years should therefore be made, and wherever possible the new work should develop out of the more practical work in mensuration. The abstract algebra, in other words, is not merely the generalized arithmetic of the mensuration course but is the extension of the concrete work. Thus, for example, the preliminary course ended with work in logarithms, and this *necessitated* some reference to negative quantities. The starting-point in algebra therefore should be a general consideration of negative quantities. This makes possible a considerable extension of the work on formulæ. The subject of simple, simultaneous, and quadratic equations is developed, naturally, as a more general

treatment of formulæ. In like manner the work on algebraic identities, treated previously as general examples in the area of rectangles, is now extended to a general consideration of such expressions and their factorization. This leads to a consideration of common factors and multiples and the application to fractions.

Too often algebra is made unnecessarily puzzling because it is not sufficiently recognized that in its highly abstract form it is a really difficult subject for young pupils. With such pupils, condemned to study algebra in its abstract form, the most that can be attained is a certain dexterity of manipulation of symbols acquired through constant application of rote knowledge. Negative numbers, for instance, present quite considerable difficulty to pupils of ten and eleven. Mathematical teachers are apt to forget that until the beginning of the seventeenth century mathematicians dealt exclusively with positive quantities. Everything is in favour of delaying the more highly abstract algebra until the pupil is sufficiently developed intellectually either to feel the need for the generalizations involved or to appreciate them. Thus, if the pupil is not required to deal with the negative quantities until, in the course of the development of some branch of his mathematics, he finds a real necessity to investigate them, he has an immediate interest in such an investigation, inasmuch as such quantities are real to him. Instead of being compelled to study these negative quantities as they are thrust at him he meets them as it were across his path. Moreover, he meets them in such a manner that he immediately recognizes them as being what they really are—the opposite to positive quantities. The fundamental processes of addition, "subtraction", multiplication, and division of such negative quantities present no difficulty. As the negative quantity is the opposite to a positive quantity, it is a matter of common sense, for instance, that if $a \times b = ab$ then $a \times (-b)$ must be the opposite to the previous product, i.e. $-ab$. Further $(-a) \times (-b)$, being the opposite to $a \times (-b)$, must be $ab$, again the opposite of the previous product. And so to the pupil the manipulative rule has no mysteries. What is equally important, he will not be found blindly applying some such nonsensical rule as "like signs give plus and unlike signs give minus".

The best advice one can give to the teacher of mathematics is, "Do not make the subject difficult for the pupil by introducing highly abstract work too soon". Progress in the end will be more rapid and more certain. Mathematical masters who have taught algebra in evening classes to ex-elementary schoolboys of fourteen to fifteen, who have previously been taught no algebra, know how rapid such progress can be.

A word is necessary regarding so-called "mental" algebra. The term mental as applied to algebra must not be confused with the term as applied to arithmetic. What is termed mental algebra is more in the nature of short sums which need little or no paper work. In the section on Arithmetic, mental arithmetic is termed "natural arithmetic", being distinct from written or mechanical arithmetic. It is so termed because

it is the arithmetic which the mind does naturally without the assistance of the artificial aid of mechanical processes. In the teaching of algebra, the modern tendency is to abandon the longer type of algebraic sum in favour of the more numerous shorter sums, and these shorter sums are still further shortened, constituting the important oral work. It is obvious that such oral work is very valuable, but it does not perform the same function as mental arithmetic. The aim in the teaching of mental arithmetic is to develop the individual's natural ability to carry through mentally, and therefore without unnecessary artificial aid, as much computation as possible. The aim of so-called mental algebra is not to develop mental processes, but rather to give as much practice as possible in a given time in the application of some new algebraical rule. It is oral work rather than mental work.

**Syllabus.**—The main function of algebra, so far as the normal school curriculum is concerned, is to furnish the mathematical equipment which will enable the pupil to become acquainted with at least the fundamental ideas of other branches of mathematics, especially trigonometry and the elements of calculus and mechanics. With this in view, the following is suggested as the syllabus in algebra covering the third and fourth years of the elementary mathematics course.

Negative numbers. The four rules applied to such numbers. Statistical and functional graphs involving negative quantities. Simple equations. Problems, including graphical problems.

Simultaneous equations.

Identities revised. Factors and multipliers.

H.C.F. and L.C.M. and fractions.

(Note.—As each type of factor is dealt with, so it should be applied to H.C.F. and L.C.M., and fractions. In other words, work on fractions should not be postponed until all types of factors have been learnt, nor should separate work on fractions be undertaken at this stage.)

Harder examples in factors and fractions may be included if time permits.

Literal equations.

Quadratic equations. Problems. Graphical treatment of quadratic functions and problems.

Variation and proportion.

Further functional representations and notation.

Limits and gradients and, if time permits, the elements of calculus.

It is recognized that this is a very full syllabus for a two years' course, but it is felt that more rapid progress will be possible following the two years' preliminary course than is usually the case. Interest will certainly be keener because the work has been postponed until the pupil is sufficiently developed mentally to appreciate such abstract work.

The nature of the latter part of the syllabus will depend largely on the type of school. In schools with a technical bias, for instance, some of the less important parts of the syllabus can be omitted in favour of calculus and its application.

**Negative Numbers.**—1. *Addition.* It has already been pointed out that if a negative quantity is regarded as the opposite of a positive quantity the rules for dealing with the combination of such quantities are largely

common-sense rules. The boy who thoroughly appreciates that $6 + 4$ means 6 increased by 4, and who knows that $-4$ is the opposite to $+4$, will have no difficulty in understanding that 6 and $-4$ must mean 6 decreased by 4.

(ii) In *subtraction*, if the addition method has been taught in arithmetic, there is again no great difficulty. For example, to find the value of $4 - 7$, we are required to find a number which "added" to 7 makes 4, i.e. $-3$. Again $4 - (-7)$ means that we are required to find a number which added to $-7$ will give 4, i.e. 11. Here the pupil by the application of common sense finds that $-(-7)$ is the same as $+7$, and it will be pointed out again that this is but the application of the idea of a negative quantity being the opposite to a positive quantity. We know that $-(-7)$ must be the opposite of $+(-7)$, and the latter being $-7$, the former must be $+7$.

(iii) *Multiplication and division.*—Reference has already been made to multiplication. Division can be approached either in the same way as multiplication or can be treated as being dependent upon multiplication. Thus:

$$20 \div 5 = 4,$$
$$\therefore -20 \div 5 = -4,$$

i.e. $-20$ being the opposite to 20, the result must be an "opposite" result.

Similarly, $-20 \div -5 = +4$ for the same reason, and so on. Or the processes can be treated thus:

$$-20 \div 5.$$

The answer must be the number which, when multiplied by 5, will give $-20$, i.e. $-4$, and so with other combinations.

It should be pointed out that this treatment of negative numbers as the opposite of positive numbers must not prevent the idea of an extended notation scale being overlooked. In other words, $-5$ must not only be regarded as the opposite of $+5$ because of the sign before it. In the sense of being as much below zero as the other $+5$ is above zero, it is the opposite of the latter. Graphical exercises with examples involving negative numbers should immediately follow this work in the four fundamental rules. Such graphical work should include statistical graphs such as temperature charts, and also the drawing of graphs of given algebraical expressions such as $2x - 5$, $2x - x^2$, &c. (See note below on *Graphs*.)

**Brackets.**—Complicated exercises in the removal of brackets are not recommended. Examples of the type found in the older textbooks provide useful exercise in rules, the application of which is mainly mechanical. It is more important to ensure that boys can distinguish between $3(x + y)$ and $3x + y$, between $a + b - (c + d)$ and $a + b - c + d$, than to be skilled in the mechanical application of rules for removal of brackets. Understanding the use of brackets is more important than skill in

manipulating them, and ability in the intelligent insertion of brackets is more important than mechanical skill in removing them.

Oral questions, designed to ensure that the pupils know exactly what the meaning of such expressions as $3(x + y)$, $(x + 5)y + c$, $a + b - a + c$, are most important. In like manner the pupils should be taught the use of brackets in such a question as "Express by the use of brackets the difference between half of the sum of two numbers and one-third their difference."

**Graphs.**—Graphical work, mainly of a statistical nature, has been included in the first- and second-year elementary mathematics course, and the pupil therefore has already become familiar with the use of squared paper. He already appreciates the importance of neatness and accuracy, a wise choice of scale, and the clear indication of the axes and the scale chosen.

The graphical work to be included in the third and fourth years of the course will deal in the first place with the plotting of simple algebraical functions of a variable, with the object of illustrating the change in such functions as the variable changes. The questions should be of the type:

(*a*) Show how $\frac{x}{5} - 2$ changes as $x$ changes; or

(*b*) Show how the value of $x^2$ changes as the value of $x$ changes from $-5$ to $+5$; or

(*c*) Show how the function of $x^2 - 3x - 10$ changes as $x$ changes from $-5$ to $+10$.

At this stage the pupil should not get the idea that graphical work serves the purpose of solving simultaneous and quadratic equations. Such work should be regarded as incidental, the main function of graphical work being the illustration of functional variation. The graphical treatment of quadratic equations arising as a development from exhibition of such functional illustration can of course be made to serve a very useful purpose, and may even be used as a method of introducing quadratic equations. Thus, in the above example, after the pupil has exhibited graphically the values of the function $x^2 - 3x - 10$, he may be asked to state the values which will make $x^2 - 3x - 10 = 0$. Such a question, however, is an extension of the main problem and, treated as such, there is no risk of the pupil regarding his square paper work as merely supplying another means of solving equations.

After the pupils have had considerable experience of various types of graphs, they should be ready to recognize the type of function which will give straight-line graphs, parabolas, &c., and other similar problems. At a later stage more difficult examples can be introduced, and simple problems relating to limits and gradients can be attempted.

**Equations.**—Here again the pupil, being already familiar with formulæ and their transformation, should be able to make very rapid progress with all types of equations. Teachers who may be apprehensive

concerning the small amount of algebra attempted in the first and second years of the course will find that much less time will now be required to enable the pupil to deal satisfactorily with simple, simultaneous, and quadratic equations. Little need be said regarding the treatment of simple and simultaneous equations beyond the importance of insisting on good arrangement of the various steps in the solution, and the importance of insisting upon all answers being tested. Burdening the pupil with rules which have to be applied to the solution of equations tends to make the work unnecessarily difficult. The application of common sense and not rules is all that is necessary. Thus, in such an example as, " Find the value of $x$ which will make $3x + 5$ equal to $2x - 7$ ", the pupil exercises common sense to the extent of treating both sides of the equation alike in order that the " balance " may be preserved, whilst at the same time so treating each side of the equation that it may be written finally in the form which will give what is wanted, viz. $x$ stated in terms of a number. Obviously the transformation made in the statements must be for the purpose of getting the $x$ terms to the left of the equality sign and the numbers to the right.

$$\text{Hence } 3x + 5 = 2x - 7.$$

This first becomes $3x + 5 - 2x = -7$, because as $2x$ must be taken off the right-hand side of the equation a like quantity must be deducted from the other side. In like manner the next step is:

$$3x - 2x = -7 - 5.$$
$$\text{Finally } x = -12.$$

In the early stages all such steps should be shown either as above, or in the following form:

$$\begin{aligned} 3x + 5 &= 2x - 7 \\ 3x(+5 - 5) - 2x &= (2x - 2x) - 7 - 5, \\ \text{i.e. } 3x - 2x &= -7 - 5 \\ x &= -12. \end{aligned}$$

The important point is that intelligent application of common sense is to be preferred to mechanical application of rules. Such rules as " take over to the other side and change the sign " should develop out of this application of " common sense ", and should never be forced upon pupils to be applied unintelligently by them.

A wise choice of carefully graded exercises helps very considerably towards making the solution of simultaneous equations again a matter of applying common sense. The first exercise should be:

$$\begin{aligned} \text{Solve } \quad x + y &= 7 \\ x - y &= 3; \end{aligned}$$

or, " The sum of two numbers is 7 and their difference 3. Find the numbers." The pupils will readily see that $y$ can be eliminated by adding

and that subtraction completes the process. The next example should be of the type:

$$\begin{aligned} 2x + y &= 6 \\ x + y &= 4, \end{aligned}$$

and the next

$$\begin{aligned} 2x + y &= 15 \\ x + 3y &= 4. \end{aligned}$$

Such a series of exercises will introduce, step by step, addition and subtraction and multiplication as the process to be employed in order to bring about the elimination of one of the unknown.

It is the usual practice in modern textbooks for equations to be introduced in the form of easy problems, then for exercises giving practice in the solution of problems to follow. More difficult problems are then attempted. It is doubtful whether in the course here under consideration any useful purpose is served by introducing equations by way of problems such as: "Find a number such that when 7 is added to it the result is equal to 21." It should be remembered that we are dealing with pupils who are more advanced and who are already acquainted with equations as formulæ. Preliminary problems as an introduction to the work on equations are therefore unnecessary.

Quadratic equations will not be introduced until later, and certainly not until factorization has been mastered. The factorization method should first be taught and ample practice be given in this type of quadratic, not only because it is the easier method but because in the solution of problems it is the method which the pupil should attempt first, applying either the "completion of the square" method or the formula should the factorization method fail. As indicated below, the "completion of the square" method is taught as a special form of "factorization method". The master should insist on all steps in the argument being inserted.

Thus, in the example:

Solve the equation $x^2 - 3x - 10 = 0$.

$$\begin{aligned} x^2 - 3x - 10 &= 0 \\ \therefore (x - 5)(x + 2) &= 0 \\ \therefore \text{either } x - 5 &= 0 \\ \text{or } x + 2 &= 0 \\ \therefore x &= 5 \text{ or } -2. \end{aligned}$$

The last step but one must not be omitted in the statement. Its omission tends to foster unintelligent mechanical work, and also leads to the error of giving the answer as $-5$ or $2$.

The method of "completing the square" should be recognized as a variation of the factorization method applicable when ordinary factorization is not possible.

Example: Solve the equation $2x^2 - 5x - 18 = 0$.

$$
\begin{aligned}
& & 2x^2 - 5x - 18 &= 0 \\
&\text{Dividing by 2} & x^2 - \tfrac{5}{2}x - 9 &= 0 \\
&\text{Completing the square and subtracting} & x^2 - \tfrac{5}{2}x + (\tfrac{5}{4})^2 - \tfrac{25}{16} - 9 &= 0 \\
& & \therefore\ (x^2 - \tfrac{5}{4})^2 - \tfrac{169}{16} &= 0 \\
& & \therefore\ (x^2 - \tfrac{5}{4})^2 - (\tfrac{13}{4})^2 &= 0 \\
& & \left.\begin{aligned} \therefore\ \text{either } (x - \tfrac{5}{4} - \tfrac{13}{4}) &= 0 \\ \text{or } (x - \tfrac{5}{4} + \tfrac{13}{4}) &= 0 \end{aligned}\right\} \\
& & \left.\begin{aligned} \text{i.e. either } x - \tfrac{18}{4} &= 0 \\ \text{or } x + \tfrac{8}{4} &= 0 \end{aligned}\right\} \\
& & \text{i.e. } x = \tfrac{9}{2} \text{ or } -2.
\end{aligned}
$$

Solution by formula should appeal to boys who have had ample opportunity of becoming familiar with the use of formulæ.

Literal equations may be introduced as a means of testing knowledge of the various methods previously employed in solving equations, but apart from such use they serve no great purpose at this stage.

**Factors. H.C.F. and L.C.M. Fractions.**—The only point here that calls for comment is that work in H.C.F., L.C.M., and fractions should follow each type of factor. As soon as one type of factor has been mastered it should be applied immediately to H.C.F., L.C.M., fractions, and other processes. In other words the question "Factorize $ax + bx$" should also be put in the forms, divide $ax + bx$ by $x$, divide $ax + bx$ by $a + b$. Again, instead of giving merely a number of expressions to factorize, questions in the following form are to be preferred: "Factorize the following, $ax + bx$; $cx - dx$; $3x^2 - x$. What is (1) the H.C.F., (2) the L.C.M. of these expressions." So with each type of factor, application of such factorization to H.C.F., L.C.M., and fractions should immediately follow. Only in this way will the pupil appreciate the purpose of such factorization, and he will find the work far more interesting. Each set of questions in H.C.F., L.C.M., and fractions should of course involve expressions of the type the factorization of which has previously been learnt. In this way constant revision is ensured.

The work in fractions as well as in H.C.F. and L.C.M. helps to illustrate the nature of algebra as generalized arithmetic, since the processes applied to algebra are practically identical with those used in arithmetic. One of the most frequent mistakes made in reduction of algebraic fractions, viz. the cancellation of terms instead of factors, will be made far less frequently if pupils have been taught reduction in arithmetical fractions intelligently. Attention drawn to the analogy between the arithmetical and algebraical processes in all work involving fractions will help to avoid many such mistakes.

## Numerical Trigonometry

Numerical trigonometry will be introduced as early as possible in the elementary mathematics course of the third and fourth years, the aim being to give the pupils a good practical knowledge of the subject, based on the use of logarithms, for the solution of triangles and practical problems such as measuring heights and distances.

The mathematical course of the first and second years leads to the use of logarithms. In the early part of the geometry course the fundamental work in angles is dealt with and problems connected with construction of triangles follow. It is at this point that elementary numerical trigonometry is most conveniently introduced. Exercises aiming at the acquirement of skill in the solution of artificial problems should be rigorously excluded. Manipulation of identities should find no place in the course. The aim will be, as already stated, to introduce the pupil to the more practical parts of the subject. The problems dealt with will be very similar to those already attempted in the elementary geometry and mensuration of the first and second years' course. The pupil will feel that he is merely bringing into use a more efficient mathematical tool.

**Syllabus.**—The course should include the following:

A. Acute angles. Trigonometrical ratios, sine, cosine, and tangent. Exercises in finding by geometrical construction the sine, cosine, and tangent of given angles. The trigonometrical ratios of angles 0°, 90°, 60°, 30°, 45°.

The use of sine, cosine, and tangent tables and checking of former geometrical constructions by means of such tables.

The right-angled triangle.

Simple examples in heights and distances.

The reciprocal ratios, cosecant, secant, and cotangent.

B. The extension of the above work to obtuse angles.

The solution of triangles and harder examples in heights and distances, including simple examples in three dimensions.

Areas.

The above syllabus is divided into two sections A and B, to emphasize the importance of recognizing that whereas trigonometrical ratios of acute angles present little difficulty to beginners, the extension of these ratios to obtuse angles is not grasped so quickly. The teacher should aim first of all at thoroughly familiarizing the pupils with the ratios, sine, cosine, and tangent and with the use of trigonometrical tables. The work at this early stage can well be confined to acute angles and the right-angled triangle. There should be ample graphical illustrative work in order to ensure that the use of trigonometrical tables does not become merely mechanical. Examples in heights and distances should, from time to time, be checked by scale drawings.

Whilst this part of the syllabus is being covered the work in geometry will be proceeding, and in algebra the pupil will have become thoroughly familiar with negative quantities. The more difficult work involved in the application of trigonometrical ratios to obtuse angles will therefore present less difficulty, whilst the study of the theorem of Pythagoras, and

more particularly its extensions, will assist in the work to be undertaken in the solution of triangles.

Mention has been made of problems in heights and distances. The application of trigonometry to the solution of other problems will of course depend very largely on the type of school. In senior schools where elementary mechanics forms a part of the curriculum, the mathematical master will have no difficulty in extending trigonometry to this branch of the work. The above syllabus is intended to meet the requirements of a general elementary mathematical course, so far as trigonometry is concerned.

In schools where more advanced work is likely it may be advisable to introduce questions on compound angles and trigonometrical identities, but even in such schools the more practical work in trigonometry should not be sacrificed during the third and fourth years in favour of the more theoretical considerations of the subject.

## CHAPTER VIII

# Conclusion

This section of *The Teachers' Guide* necessarily deals very largely with the subject-matter of the elementary mathematics course, but throughout, the aim has been to impress upon those to whom mathematical teaching is entrusted that a knowledge of the pupil and his mental development is as important as a knowledge of mathematics. If learning is to be through experience rather than by rote, the teacher's task is to know what constitutes a real experience for the pupil. This necessarily implies that understanding the pupil is as important as understanding the subject. As was pointed out in the previous section on Arithmetic, the teacher armed with a sound knowledge of the underlying principles of child psychology will plan his work and adapt his methods to suit the mental development of the child. Above all he will appreciate the important fact that interest in mathematics is maintained not merely by making the subject-matter palatable to the pupil, but by developing in the pupil a keen sense of power of achievement and a desire for further achievement. It is the pupil's own powers of observation and reasoning which have to be developed, the pupil's own initiative and inventiveness which have to be encouraged to the utmost, and all this requires of the teacher a sound knowledge and understanding of the pupil himself.

The value to the teacher of a knowledge of the history of mathematical development has also been emphasized. What is known in psychology as the " culture epoch " theory is particularly applicable in the teaching of mathematics.

The elementary mathematics course here suggested follows very largely the historical development of the subject. Geometry, for instance, has been treated in the early stages as "earth measurement", and the work has been based on a fairly complete course of mensuration. Again, recognition has been given to the fact that abstract algebra is, comparatively, a late development and, for that reason, the teaching of such algebra has been deferred to quite late in the course. For the same reason, work in connexion with negative quantities has been postponed to the third year of the course. In stressing the importance of a knowledge of the historical development of the subject and the significance of the culture epoch theory, one is of course only emphasizing once again the importance to the teacher of mathematics of a knowledge of child psychology.

Lack of sympathetic understanding of the pupil and not the difficulty of mathematics tends to create distaste for the subject. In this connexion the importance of the teacher's own personality must not be overlooked. As previously mentioned, to be a successful teacher of the subject one must not be merely keen, alert, and enthusiastic, but must be contagiously so. At the same time the teacher's own enthusiasm and keenness must never tempt him to be impatient with the slower pupil or to indulge in sarcastic disparagement of the pupil who finds the subject difficult. On the contrary, the teacher must exercise the utmost patience and ever be ready with sympathetic encouragement.

This is not to say that all difficulties are to be removed from the pupil's path or that the teacher must do the thinking for him. "Spoon feeding" cannot be too strongly condemned. Under the sympathetic guidance of the teacher the pupil must fight his own mental battles, and as he gains the mastery so he gains in confidence, self-reliance, and even self-respect. The test of successful mathematical teaching is the progress which the dullards and those of just average ability make rather than the progress made by those who are likely to develop into mathematicians. The mathematical teacher must never forget that his task is "mathematical education" rather than "the education of mathematicians".

Finally, the importance of careful and systematic correction of the pupil's work must be fully appreciated. No work should go unmarked and no work, having been marked, should go uncorrected. As soon as possible after the exercise has been done the work should be marked, and whatever is wrong should be immediately corrected by the pupil. Closely linked with the questions of "corrections" and "marking" is the question of choice of homework. Unless the utmost care is exercised in selecting mathematical homework, utter distaste and even a loathing for the subject can be created. Both as regards quantity and degree of difficulty, the exercises set should be of such a nature that the pupil feels the task has been worth while. Homework should increase confidence and self-reliance; it should never cause discouragement or a feeling of hopelessness, particularly in the early years.

If throughout this and the preceding section the importance of the

development of the child has been emphasized as being the principal concern of the mathematics teacher, it must not be thought that the cultural value of mathematics is underestimated; far from it. The ideal mathematics master is perhaps he who has faith in the child and a like faith in mathematics as an educational instrument. "We want mathematics," says Giovanni Gentile, "but we want it *in* the man. And the same for religion, economics, poetry, and all the rest. Culture," he says, "is not in books, nor in the brains of others. It is in our own souls as it is gradually being formed there."

And what are we to understand by mathematics being *in* our pupils, being in their souls? "A man," says G. St. L. Carson, speaking of the purpose of teaching mathematics, "who has in his mind this chain of processes, observations, speculation, proof of consistence in speculation, rejection of redundant speculation, and finally the erection of deductions on this foundation, is in possession of an intellectual creation which, in beauty alone, is worthy to rank with the creations of poetry, music, or art; and beyond this, it is a possession which in so far as it guides his life will make him a more efficient labourer and a better citizen."

*The writer desires to acknowledge the instruction he derived some years ago from "A Study of Mathematical Education" by Benchara Branford, and from the series of essays contained in "Mathematical Education" by G. St. L. Carson. The re-reading of both these works has been particularly helpful in the preparation of these two articles.*

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